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Notes of the Month

WORLD COTTON TRADE RECOVERY

In those countries for which regular statistics are available, cotton yarn output throughout the world showed an increase of approximately 8% in the second quarter of this year compared with the same period in 1958 whereas in the first quarter output had been much the same as a year earlier. According to the latest Cotton Board statistical review reports from many countries mentioned better levels of activity, lengthening order books, and in some but not all cases, improved margins. Cotton yarn output in the U.S. in this second quarter—as measured by cotton consumption—was as much as 16% greater than a year earlier and substantial increases were also recorded by Japan, India, Germany, Italy, Belgium, Canada, Egypt, South Korea and probably Pakistan. Output in the U.K. was also slightly greater than a year previously but France was the principal exception to the rule. Exports of cotton piece-goods from non-Communist countries were 2% higher in this second quarter compared with the same period last year, although exports in the first quarter were 10% lower. In the first six months of this year exports from France, Western Germany, Belgium, Switzerland and the Netherlands were greater than during the first half of 1958 but shipments from the U.K., U.S.A., Japan, India and Italy were smaller. Reports from several countries indicated expectations of increased exports during the second half of this year. Exports of man-made fibre fabrics increased slightly in the second quarter, shipments from Japan continuing to be comparatively depressed. Total world trade in these fabrics during the first six months of this year was about 14% less than in the first half of 1958 with Japan, the U.S. and the U.K. exporting less and Germany, Italy, Belgium and the Netherlands increasing their shipments.

In the U.K. the rate of yarn output per working day (i.e., allowing for official holidays) has been consistently greater than a year ago ever since May. From a peak in June there was a slight falling-off but in August it still showed an increase of about 9% compared with the January figure. This increase was virtually confined to cotton and cotton waste yarns, where it has amounted to as much as 11%. Output per working day in the weaving section did not exceed that in the corresponding month of 1958 until July but in that month the rate was 13% greater than in January with the increase—in the case of cotton cloth—being as much as 15%. This substantial expansion in the rate of production took place despite a decline of 8,000 in the number of workers on mills' books since the beginning of the year. The improved tone of business dates back to April, arising from a combination of the low level of pipeline stocks and the upward movement in raw cotton prices. Expenditure on clothing in the second quarter—corrected for price changes—showed an increase of no more than 6% in contrast to the second quarter of 1958 and retail sales in July seemed to be no more than 4% greater than in July last year. Faced with the prospective withdrawal of many producers from the industry as a result of the government's reorganisation scheme, order books have lengthened and prices tended to rise as buyers have tried to secure supplies. Referring to the question of machinery scrapping, the review states it is clear that a relatively modest extension of shift-working would be sufficient to maintain production at present levels.

Exports of cotton piece-goods from the U.K. totalled 86 million sq. yds. in the second quarter, compared with 82 million in the first quarter and 91 million in the second quarter of last year. The main decreases were in shipments to Australia, New Zealand, South Africa, French Africa and Ceylon. Conversely, there was a sizeable increase in exports to Burma as a result of the triangular arrangements, and larger shipments to British West and East Africa, Rhodesia and Nyasaland, and the Irish Republic. The second quarter level of exports was maintained in July and August when 57 million sq. yds. were shipped, and there was reason to hope there would be a further modest increase during the remainder of the year. In the first six months of this year exports of man-made fibre piece-goods were well below the levels reached in the same period last year, with big reductions in shipments of Australia, New Zealand, South Africa, Rhodesia and Nyasaland, and the Irish Republic. As with cotton piece-goods the decline seemed to have been halted, at least temporarily. Exports of cotton yarn have also been much lower so far this year than last. The second quarter imports of cotton piece-goods at 116 million sq. yds. were only slightly less than the very high first quarter figure. Imports from Hong Kong, India and China were rather smaller but receipts increased from Japan and Pakistan, and the high import level was maintained during July and August. In comparison, imports of cotton yarn declined from a peak of 6·2 million lbs. in the first quarter to 4·9 million in the second, with July and August receipts running at a still lower level. The long-awaited agreements with the cotton industries of India and Pakistan were concluded, providing for retained annual imports of 175 million sq. yds. and 38 million sq. yds. respectively over a three-year period beginning 1960.

The textile situation in the U.S. is reported to be the most favourable for several years and one indication is the average margin between raw cotton and loomstate cloth prices; these have been widening steadily since last October and amounted in July to 28·75 cents per lb.—the highest figure since 1956 and 7·10 cents higher than in July last year. Mill consumption of raw cotton in the second quarter of this year was 16% more than in the same period in 1958 while mill consumption of man-made staple increased by some 25%. Increases in cloth production in the first

quarter compared with the same period in 1958 were 2% for cotton cloth, 7% for rayon cloth and 5% for synthetic fibre fabrics. Exports of cotton piece-goods totalled 118 million sq. yds. in the second quarter compared with 143 million in the same period in 1958. Exports to Canada were well maintained but there were sharp drops in shipments to Venezuala, the Philippines and South Africa. U.S. exports of man-made fibre piece-goods were larger during the second quarter than those in the first quarter or the corresponding quarter of last year. The campaign to restrict imports of made-up goods from Hong Kong had been supplemented by a broad attack on imports of cotton goods from all sources.

Output in all the main branches of the Japanese cotton and allied textile industries was greater in the second quarter of this year than in the second quarter of 1958. The increase was greater in spinning than in weaving and was particularly marked in the case of synthetic fibres. The drastic curtailment of production has taken effect this year and burdensome stocks have been largely eliminated. The situation of the industry has been further improved by an upsurge in domestic demand and, more recently, in export orders. It was possible, therefore, to release stocks of cloth which had been "frozen" since August 1958 and to relax the curtailment of production, first in July and again in October. As a long term measure to prevent overproduction, about 1¼ million spindles were "mothballed" in May. Exports of cotton piece-goods totalled 295 million sq. yds. in the second quarter of 1959, compared with 291 million in the first quarter and 306 million in the second quarter of 1958. In the first six months this year Japan lost trade with Ceylon, Hong Kong, Germany, the Netherlands, Indo-China, Syria, the Sudan and the Phillipines. In contrast, exports to British West Africa, Australia, Iran, Burma, and Siam expanded and exports are expected to increase in the second half of the year. Exports of man-made fibre piece-goods from Japan amounted to 257 million sq. yds. in the second quarter of this year compared with 331 million in the same period in 1958. Shipments to Singapore, British West Africa, Germany and Indo-China were lower.

Cotton yarn production in India had been running about the level of a year ago since the beginning of the second quarter and mill production of cotton cloth had been doing so since May. Unsold stocks of cloth at the mills had been reduced to about 311 million yds. at the end of July compared with 491 million at the end of 1958 and 677 million at the end of 1957. Exports of cotton piece-goods remained relatively depressed in the first half of the year and final figures in the second quarter are expected to show that shipments were slightly less than in the first quarter. It is understood that arrangements were finally settled for the installation of 3,000 automatic looms to weave cloth for export. India had also been exporting sizeable quantities of rayon piece-goods since the middle of last year.

Cotton yarn production in most of the Continental cotton textile industries was about the same in the second quarter as a year ago, whereas in the first quarter output had been 12% less than a year earlier.

EDUCATION FOR THE TEXTILE INDUSTRY

"I would therefore press the claims of the textile industry on any who are concerned with directing the youth of our country to an attractive and fruitful career. In spite of all that has been said about it in recent years the textile industry remains one of the great industries of this country. In these days there is a tendency to regard as progress any development that succeeds in performing an essentially simple operation in a complicated way, and as a result we are surrounded with gadgets produced by industries that offer many superficial attractions to the youth of the country. But to consider only one item in the activities of the textile industry, clothing is likely to remain a basic human need long after many of the gadgets have disappeared, and the textile industry will outlast many others that appear more immediately attractive. From the purely materialistic point of view the rewards it offers to those who guide and control it are far from small, and its apparent lack of excitement to those seduced by the glitter of more glamourised industries merely increases the opportunities available to those sufficiently far-sighted to seize them. But although material rewards inevitably and rightly occupy a high place in the minds of those thinking of entering the industry, those of us who have been in it for some time recognise that there are other things more important. Perhaps because of the variety of its materials, its processes, and its problems perhaps because of the intense satisfaction that comes from producing useful, simple things that are also things of beauty, the industry is able to offer a full and happy life to those who share its fortunes." This was the considered advice of Dr. A. R. Urquhart, B.Sc., F.T.I. (assistant director, Shirley Institute) when he delivered the Mather Lecture of the Textile Institute in Manchester on October 27th.

After reviewing the education facilities available to modern youth Dr. Urquhart dwelt on some of the problems relating to education for entrants to the textile industry. He contrasted the parental preference for "apprenticeship" schemes to the detriment of others not so classified but offering a better service and thought the absence of a recognised apprenticeship scheme for the textile industry was on this score alone a disadvantage.

Discussing education for managers Dr. Urquhart contrasted the modern craze for training in what had been described as a "gadget bag" of techniques with true education in management. Because by the very nature of his work a manager had to be something of a jack-of-all-trades it was even more necessary that he should be a master of *one*. In this connection Dr. Urqhuart referred to the Shirley course in scientific management. "In our many contacts with management in the cotton section of the textile industry we at Shirley have been persuaded that possession of the necessary characteristics enhanced by an adequate knowledge of the techniques of scientific management is not enough; we believe that their fruitful application demands that the manager shall be so imbued with the scientific attitude that he automatically applies scientific method to all his problems, organisational and personal as well as technological. This does not necessarily require a detailed knowledge of any particular science; what it does require is the complete objectivity that bases decisions on the evidence available, quite independently of preconceived notions, whether one's own or anyone else's, coupled with the questioning attitude that insists on obtaining the evidence for all dogmatic statements." In an attempt to inculcate this attitude of mind Shirley Institute is providing a course for managerial trainees that lasts ten months; although lectures and exercises of one kind or another form a part of it the course consists essentially in giving the trainee an opportunity of investigating a minor research problem in association with a team of professional research workers, in the belief that by continuous association for a prolonged period with minds that are ingrained with the desired attitude the trainee must be infected by it.

Textile Mill Maintenance—Part 2

To reduce maintenance effort through process control it is essential to eliminate all unnecessary equipment also to be constantly on the alert for upsetting influences and their secondary effects.

By F. H. SLADE, A.M.I.MECH.E.

BEFORE considering the maintenance of specific factory service and plant, it is well worthwhile to seek means whereby this work may be lessened, or rendered more efficient. To assist in the achievement of this objective, it has been recommended that production and maintenance groups should be encouraged jointly to examine critically existing techniques of operation, with a view to reducing maintenance effort. Consistent failure of a piece of equipment may be the fault of the operation rather than the unsuitability of the equipment itself, or its method of use, and the trouble can frequently be corrected by minor adjustments to production techniques.

Resort to Past Experience

The installation of new machines often offers an opportunity of incorporating features which past experience has shown will assist maintenance; but there is no reason why this should not also take place during equipment overhaul, or periods of process plant shut-down. Several such features are suggested, as for example, cathodic protection as a means of safeguarding buried steelwork and pipelines, and the use of synthetic plastics such as liquid meoprene, applied by brush or spray, as a protection of internal steel surfaces against corrosion. De-aeration is also effective in preventing corrosion in water-cooled equipment.

Current practice here and overseas indicates a trend towards the elimination of flanged joints wherever possible and their substitution by welding; particularly for joints inside vessels, such as cooling or heating coils. Pump gland maintenance may be reduced by the use of mechanical seals where applicable. If corrosive liquors are being handled resort should be had to pneumatic equipment as a substitute for pumps where pressures are low enough.

Maintenance is also facilitated by simplification, and standardization of plant design. The former is exemplified in the simplification of machinery guards so that they may be easily removed for inspection and servicing of plant. Standardisation of plant employed does, without doubt, simplify the spare part question or even permit the holding of a standby unit thus permitting routine overhaul without any interference with a planned production schedule.

Ventilation, with or without air-conditioning, may be essential for worker welfare and for process efficiency. It also, if properly equipped with air filtering devices, serves to protect machinery and plant from the effects of air-borne dusts. Where no such system exists, it is still often necessary, or advantageous, to equip machinery, as for example, air compressors and electric motors, with means for air filtration.

In the process industries, the approved instrumentation for process control has resulted not only in achieving the desired objective, but also in reducing maintenance effort. This is easily understood; to operate a plant under constant conditions of temperature, pressure and rates of flow tends to reduce operational upsets, and hence maintenance effort. The automatic control of the pH value of certain critical streams within a plant may also reduce or completely eliminate failure due to corrosion. The instruments must, however, be maintained in perfect working condition.

Even with a plant operating under steady conditions, deviation from minimum overall maintenance can still arise from faults in operation of the factory plant itself. For example, power, steam, and water failure, etc., can, apart from its immediate effect, cause secondary troubles unless guarded against, whilst similar effects can be experienced from raw materials supply failure. Another frequent cause of maintenance effort is thermal expansion and contraction. This can usually be eliminated by keeping a heat service line, or other piece of equipment, hot, even though it may be temporarily taken out of service.

It is recommended that, in general, to reduce maintenance effort through process control, the principle should be followed firstly of achieving the maximum amount of simplicity within the plant itself by eliminating all unnecessary equipment; and secondly, of being continually watchful of possible upsetting influences and their secondary effects.

Plant Layout and Replacement

The plant engineer is often, in consultation with others of a factory directorate, intimately concerned with the problems of plant layout and replacement. It is stressed that sufficient space for maintenance work on equipment and facilities must be provided in the plant layout. Maintenance requirements should be considered very carefully when making decisions on equipment. So also should first cost, in relationship to maintenance. Too often the former are permitted to eclipse all other conditions, those responsible for installation fail to recognise that maintenance costs can easily nullify the advantages of a cheap initial layout. Many examples may be cited. One thus quoted is of a close-coupled motor pump utilising a high-speed motor which may require less space and lower initial cost than a standard motor combined with a coupled pump. On the other hand, if replacement of the impeller and shaft becomes necessary, the repair cost with a close-coupled motor pump is much greater than with an orthodox coupled pump. Similarly, a compact system of piping, valves and equipment may be cheap and convenient for the operator's use, but maintenance of the system may

need costly and time-consuming dismantling operations.

The value of replacement studies should not be overlooked. Naturally, constant part renewal and excessive maintenance usually indicates immediate replacement by new plant, but this only represents one of the many reasons for effecting a change. According to one authority, the reasons for making replacements may be divided into two general types. These are:—

(1) An existing equipment must be replaced or changed in order to continue operation and meet the required demands for service or production.

(2) An existing equipment is capable of yielding the necessary product or service, but more efficient plant or equipment is available which can operate with lower expenses.

The replacement reasons under type (1) may be further qualified in that equipment renewal is necessary because (*a*) it is worn out and gives no further useful service, (*b*) it does not have sufficient capacity to meet service or production demands, or (*c*) operation is no longer economically feasible with the existing equipment because changes in design or product requirements have rendered it obsolete.

When the reason for replacement falls within any of these categories, there is no alternative but to make the necessary change. The correct decision as to the desirability of replacing existing equipment for the reason given under type (2) cannot be so easily determined. It depends on a clear understanding of theoretical replacement policies combined with a careful review of many practical factors. As already stressed, the operating expenses with the present equipment must be compared with those that would exist if the change were made, whilst practical considerations, such as the amount of capital available or the benefits to be gained by meeting a competitor's standards, may also have an important bearing on the final decision.

From the foregoing brief notes it will readily be appreciated that plant records and replacement studies are very closely interlinked. Some of the reasons given for replacement appear to be outside the duties of a plant engineer, but they are not entirely so. For example, when deciding on the replacement of an existing equipment not at the end of its estimated service life by one of more advanced design, it is necessary, amongst other considerations, to take into account both the reduction in expenses obtainable by making the change and the amount of new capital necessary; based on conditions at the time the change was envisaged.

Assuming that both equipments will perform the same service, the expenses or cost to be compared will be those due to operation and maintenance, also operational time lost through withdrawal of the equipment for maintenance. The latter is most important and can only be estimated from plant records, and careful study of design and constructional features of the proposed new equipment.

Heat Producing Plant

A factory should, so far as possible, be regarded as a single heat-using unit. Thus, instead of heat being supplied to several separate points of consumption and the surplus going to waste, the process line should be so arranged, without interference with production, that waste heat from one stage in the process should, if possible, be usefully employed in another stage.

Waste heat in the flue gases discharged from a boiler is the largest single source of heat loss in a boiler plant. Practical considerations preclude a boiler heating surface sufficiently large to be effective in extracting the heat from the low temperature gases at the leaving end. This obstacle to maximum heat utilisation can, however, be circumvented in large boiler plant by recovering the available heat in the flue gases partly by an economiser and partly by an air-heater, and in smaller plant, by an economiser only.

Proper boiler-house instrumentation is also essential to efficient plant operation, whilst steam metering is of the greatest value in checking steam consumption by the various departments and processes; rapidly indicating sources of steam wastage, and likewise of saving. A further feature not to be disregarded is that of automatic control. This ensures (*a*) adequate steam production and constant pressure irrespective of varying conditions of usage, with minimum consumption of fuel; (*b*) reduction of maintenance costs to the lowest possible level; and (*c*) advantages of (*a*) and (*b*) with the minimum of mechanical equipment and boiler-house personnel.

Some careful thought is needed here, for, as all boiler houses differ in layout and plant installed, it is not possible to apply the same control scheme in every case and modifications are needed to suit local conditions. They can, however, be regarded as falling into two broad classes, namely, parallel and series systems. Each can again be subdivided into two further classes, to give respectively position control or metering control. It is thus given that in the parallel arrangement shown at (1) in Fig. 8, the initiating signal comes from steam pressure and is transmitted in parallel to the fuel feed and air flow controls, calling for corresponding adjustments on each. The fuel feed and air flow controls are each calibrated to the master signal, so that the correct amounts of fuel and air are fed to maintain steam pressure and fuel/air ratio.

In a parallel position control system, as used on the smaller stoker-fired boiler units, fuel feed and air flow are adjusted in relation to the positions of a stoker speed regulator and air flow regulating damper, the servomotors operating these auxiliaries being adjusted to maintain an approximately correct air/fuel ratio over the controlled load range. This system has its limitations, in that a certain damper position does not always produce a given air flow, due to varying conditions in the boiler and on large boilers a metering control system is therefore preferred. This enables the fuel/air ratio to be maintained accurately under all conditions, but it is, of course, more costly than the simple position control system.

With the parallel metering control system, the actual air flow is still controlled in parallel with the fuel feed, but it is also measured by means of a suitable regulator, which incorporates an adjustable cam device, to ensure that optimum combustion efficiency is maintained at each point in the load range. A special relay is usually embodied as well, to enable adjustments to be made to the fuel/air ratio should the coal quality vary.

In the first of the series arrangements (2) of Fig. 8, steam pressure initiates a signal which controls the fuel flow needed to keep constant steam pressure. The rate of fuel flow thereby set up is measured and a second signal generated in accordance with the fuel signal. Inasmuch as air flow follows fuel flow, it is easily seen that any failure in fuel flow will cause a corresponding cut back in air flow. Similarly, if any limit exists on maximum rate of fuel, this system assures that air flow will not exceed the limit.

This arrangement can be based partly on position control, and partly

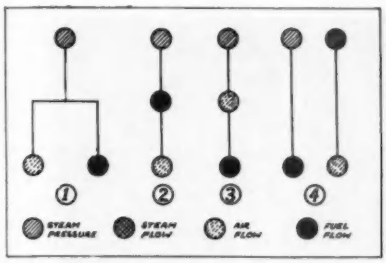


Fig. 8. Control systems, as shown, fall into two broad classes; parallel and series. Each is again subdivided into two further classes to give, respectively, position on metering control

on metering control, since the fuel flow must at any rate be measured. For example with a gas-fired boiler unit the fuel flow can be governed by position control of a regulating damper, from steam pressure and air flow in a similar manner from the rate of fuel flow. Such an arrangement is rarely used, however, unless the gas and air pressure before the regulating dampers can be relied upon to be at constant values. More generally a metered amount of fuel is regulated in accordance with steam pressure, and a metered quantity of air in relation to fuel flow. This latter arrangement is in general practice on single or mixed gas-fired boilers and allows accurate fuel/air ratio to be maintained, usually with provision for adjustment in the event of change in the fuel calorific value.

The second of the series arrangement (3) of Fig. 8, is similar to the first, except that the air flow and fuel feed are interchanged in the sequence. In this arrangement, steam pressure initiates a signal which controls the rate of fuel feed. This system possesses the advantage in that any failure in air flow will result in an automatic decrease in the rate of fuel flow to the value corresponding to the available air supply, and is thus commonly used on oil-fired boiler units. Again the system can be based partly on position control, with metering only on the air flow, and this is usually adopted for simplicity on oil-fired boilers.

The steam pressure governs the position of an air regulating damper, and the air flow set up is then measured by means of a special fuel/air ratio regulator which incorporates a ratio mechanism. This is to enable adjustments to be made to the control setting in the event of changes in the calorific value of the fuel, or if the burner tip sizes are changed. This fuel/air regulator then controls the opening of a pressure compensated oil valve.

The last scheme (4) of Fig. 8 is in fact a series control arrangement similar to that shown at (2) but differs in that the steam flow/air flow control is direct, and does not involve parallel connector circuits. This system is known as the "differential master method of fuel/air ratio control," and is based on the fact that an almost constant quantity of air is needed to produce a given number of heat units, irrespective of the type or calorific value of the fuel used.

Low Efficiency

The main causes of low boiler efficiency are:—

(1) Admission of air greatly in excess of the quantity required to burn the fuel, (*a*) through and over the fire, or both, (*b*) through cracks in the brickwork setting, (*c*) through spaces between the boiler and its brickwork, and (*d*) at badly fitting access doors, damper slots, superheater cover boxes, etc. In addition to the loss of heat, wastefully absorbed in raising the temperature of this excess air, the effects of leakages are cumulative. The total volume of flue gases to be handled is increased, with a bad effect on the draught. Induction fans are overloaded, calling for an increased output from the motors or engines driving them.

(2) Inadequate control of combustion due to (*a*) lack of facilities for the correct adjustment of dampers, or even absence of dampers, and (*b*) incorrect control of forced and induced draught.

(3) Dirty boiler surfaces and flues retarding the rapid transfer of heat from the flue gases to the water and steam.

(4) Short-circuiting of the flue gases, causing diversion of the hot gases from their normal path and so preventing the transfer of heat to some of the heating surfaces, thereby increasing the stack losses.

(5) High loss of heat from the outside surfaces of the plant caused by excessive radiation due to the absence of lagging, or to poor or inefficient lagging of exposed boiler drums, steam pipes and hot feed-water pipes.

(6) Losses of steam and hot water, due to leakages from valves and flange joints.

(7) Incomplete burning of the fuel, resulting in a high loss of carbon in the ashes. This is not usually caused by poor maintenance but if the grate is not in good condition, the loss is aggravated.

Many of these losses can be remedied by periodic inspection, and prompt attention to details causing the fault. Such treatment will not only maintain boiler-house efficiency, but assist in preventing what may lead to a major breakdown. However, losses in the actual boiler house cannot always be attributed to lack of maintenance, for contributory factors (2) and (7) can be caused by incomplete boiler-house equipment. Factor (5) is essentially one of heat-insulating materials, while factor (3) can be quite easily aggravated by inadequate equipment for cleaning deposits which occur on the heating surfaces of a boiler unit. In addition, load distribution between a number of boilers operating in parallel, and intermittent operation of boiler plant, can have a marked influence on the overall efficiency and coal consumption.

Boiler Fouling

The extent of fouling of a boiler is indicated by rise in temperature of the flue gases; the nature and extent of the deposits which occur having a direct bearing upon boiler efficiency. For example soot 0·05 in. thick in the boiler plates reduces heat transfer by approximately 15%, whilst 0·50 in. will cause a reduction of about 55%. Brushing and scraping of the gas surfaces is an accepted method of cleaning combustion deposits, but resort should be had to means less laborious and time-wasting.

Air percussion lances are finding ready application in the cleaning of all shell and water-tube boilers, economisers and air heaters. In the case of a water-tube boiler, for example, a whole shift's work by a cleaning gang can be done in one hour with such equipment. It has a high-frequency shock action which quickly blasts away soot, clinker, and most kinds of "nesting" from the gas surfaces of the boiler.

With the lance, an 80 lbs./sq. in. air-line pressure can give a cleaning effect of a 1,600 lbs./sq. in. steady pressure. In operation, an incorporated valve opens and shuts 1,500 times/min.; to convert the steady potential energy of an air line into a kinetic force which is applied 1,500 times/min. to the surface to be cleaned. The cleaning of gas surfaces must not in any way be confused with the cleaning of water surfaces, for which mechanical cleaners or other means, should be employed.

Boiler feedwater, in the ideal state, should be chemically pure. This requirement is even more essential if a common supply is used for both boiler feed and process work. To further this aim, plant of the type illustrated in Fig. 9 may be employed. The ill-effects of impurities in feed-water in so far as the boiler alone is concerned are: lowered efficiency due to deposition of scale on heating surfaces; the liability to priming; the loss of heat in blowing-down the boiler; the loss of boiler availability; the expense and inconvenience of shutting-down; and the difficulty of scale removal.

The most apparent forms of trouble from scale formation are those of heat losses and boiler plant and tube failures. In the first case, the insulating properties of scale cause a great deal of loss by inferior conduction of heat. In the second instance, trouble is caused by local overheating of boiler plates and tubes, which eventually fail at these points, and may put a plant out of commission for a considerable time. Modern feedwater treatment does to a large extent prevent scale formation; also corrosion, foaming and embrittlement. It would, however, be falacious to assume that such treatment entirely eliminates the forming of a scale, and the need for its removal.

Another feature to be noted is that it is not always the amount of scale which counts. It is the porosity which is important. In other words, $\frac{3}{8}$ in. of porous scale will often leave a boiler running more efficiently than $\frac{1}{8}$ in. of non-porous scale. With tubular boilers, it is difficult to assess scale formation by inspection, and in fact, this can prove very misleading. Regular de-scaling is the best preventive measure.

It should, nevertheless, be observed that usually plant engineers have no fixed ideas or rules on boiler de-scaling. Either they do it yearly, when a factory is closed for holiday; at closer intervals of time, or when the boiler-man reports longer time taken in "getting-up" pressure. The foregoing remarks also apply to economisers, condensers and all types of tubular plant. In the case of drum types of boilers, such as Lancashire, Danks, Galloway, etc., it is, of course, easier to assess the scale formation when the plant is closed down, but the dates or times of cleaning usually apply as in the case of tubular boilers.

It has been found that uninhibited 0·01 to 0·03% acid is very effective in dissolving and disintegrating adhering boiler deposits, and that acid of this strength, which is easily prepared by passing a normal water through hydrogen-zeolite softeners, is not strong enough to make a substantial attack on boiler metals while the short cleaning period is in progress.

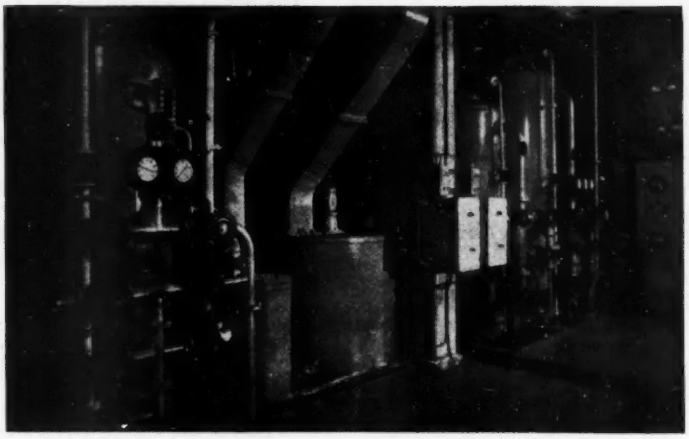


Fig. 9. Permutit "Deminrolit" plant for the supply of de-mineralised water; for feedwater to boilers, and processes requiring water of high purity

A solution known as Starit, produced by Starit Ltd., is also used for cleansing boilers and other industrial plant. It is a stable solution which, it is claimed, has a high capacity for dissolving scale by virtue of the strong acid present and yet has practically no action on most metals used for plant under the severest conditions of test. It is thus a safe and rapid solvent for cleansing purposes, especially for such equipment which is not wholly accessible to cleaning by hand or mechanical means. It is usual that the largest and most dangerous deposits occur in restricted and inaccessible passages. Chemical de-scaling may again be effected by the "Clensol" system, by a maintenance staff with inhibited solvents, or by that concern's service mechanics, on contract.

Heat Insulation

In endeavouring to effect fuel economy and increase efficiency in steam-raising plants and process steam installations, there is probably no single factor common to all industries using heat which can be responsible for a greater saving in fuel than efficient insulation. The heat loss from 1,000 sq. ft. of exposed surface, where the working pressure is 100 lbs./sq. in. represents an equivalent loss of 300 tons of coal annually, and even a pair of bare standard 9 in. dia. flanges on a steam main at a pressure of 150 lbs./sq. in. can be responsible for a heat loss equivalent to more than a ton of coal per year.

The loss does not rest here, as can be shown in the case, for example, of a boiler supplying superheated steam through pipes to a steam engine or turbine. The primary heat loss is the heat actually lost through the insulation whilst the steam is passing through the pipes between the boiler and engine stop valves. The heat loss so determined, however, takes no account of the amount of steam transmitted nor of the state of the steam after transmission. The secondary heat loss is that due to the loss in efficiency at the receiving end caused by the deterioration in steam quality and temperature. By determining the secondary losses and comparing them with the primary, it has been found that the total heat loss (primary + secondary) exceeds the primary loss by between 40 and 100%.

Fig. 10 shows the ratio between the total fuel saving F (primary + secondary) and the primary saving F_1, plotted against the steam temperature at the boiler. Steam at two different pressures, 250 and 600 lbs./sq. in. have been taken and in each case a comparison has been made between the steam expanding in the engine to atmospheric pressure (15 lbs.), and alternatively to 90% vacuum (1·5 lbs.). The secondary loss increases with steam temperature and tends to be proportionally greater for low pressure steam. The secondary fuel saving obtained by incremental insulation can attain from 40 to 100% (F/F_1 = 1·4 to 2·0).

In the case of saturated steam, the secondary losses are not due to deterioration in steam quality since the steam temperature is constant and it becomes more a question of efficient

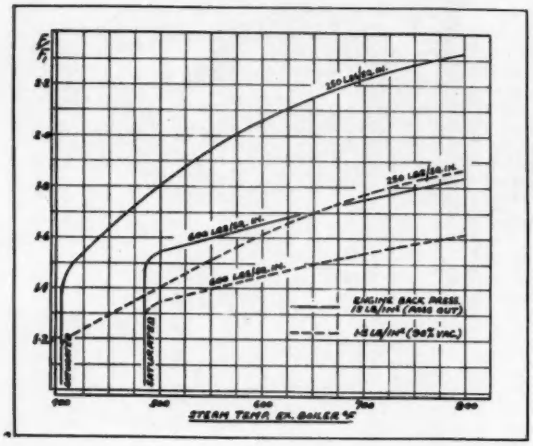


Fig. 10. Graph showing the ratio between the total fuel saving (F) and the primary saving (F), plotted against the steam temperature at the boiler

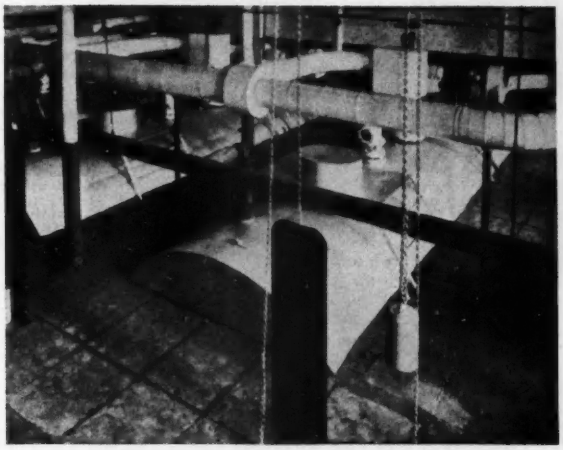


Fig. 11. View of Lancashire boiler crowns insulated with "Rocksil" and protected by sheet metal

steam trapping than of insulation to avoid secondary losses. This is only true if the condensate is returned to the boiler without loss of heat.

For saturated steam in the range of 50 to 450 lbs./sq. in. the ratio F/F_1, increases from 1·25 to 1·5 representing secondary losses amounting to between 25 and 50% of the primary losses. In the case of a 6-in. bore pipe carrying superheated steam to pass out turbine (atmosphere pressure exhaust steam to waste) the secondary heat losses justify an increase in insulation thickness of between 1 in. and $1\frac{3}{8}$ in. If the heat in the exhaust steam is utilised, then the secondary losses are reduced, the reduction depending upon how much of the available heat is used.

Thus, it will readily be seen, the reduction of heat loss by insulation, and the maintenance of this insulation in a sound condition, is a practical means of achieving a substantial economy in fuel. By using materials which are readily available, and can generally be easily and quickly applied, there need be no interruption to the operation of the plant and to process routine. Great care must, however, be exercised in applying the insulation, as much of its value can be destroyed by improper installation. An example of properly lagged equipment is illustrated in Fig. 11.

Furthermore, the insulating materials must be protected from moisture and mechanical damage. Most insulants readily absorb moisture, which greatly reduces their efficiency, whilst damage can quite easily be caused by plant operatives walking on unprotected pipes and vessels. Protective materials include special cements, bituminous waterproof compounds, felts, sheet metal, all of which have relatively high thermal conductivities, and therefore afford little resistance to the flow of heat.

A protective material once applied, should be cheap in maintenance cost and require only such attention as is necessary to maintain its appearance and durability. For example, a protective layer of hard setting cement which is then painted, is cheap in initial cost but often requires an annual overhaul to repair damaged portions, and repainting. On the other hand, a layer of aluminium sheeting is obviously more expensive to install, but requires little in the way of maintenance and becomes a more economical proposition when viewed over a long period.

It is, nevertheless, stressed that heat insulation to be effective, should be applied to all surfaces not doing useful work; this including valves, pipe flanges, etc. Care must be exercised with the latter fittings to ensure ease in accessibility; without having to break the run of insulating materials. Recommended methods of doing this are shown in Figs. 12 and 13. In both cases it will be seen that the insulation is applied in such a manner as to facilitate easy removal when the joints are to be tightened or renewed; the method illustrated in Fig. 13 provides also for frequent inspections, without the need for making good with plastic material.

(To be continued)

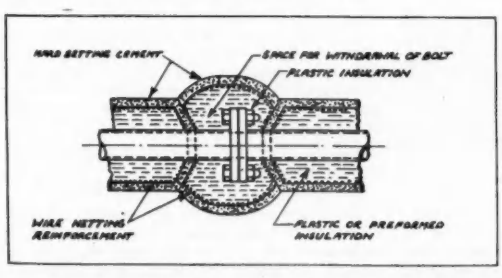


Fig. 12. Plastic insulation on bolted pipe and vessel joints should be independent of the main insulation when the joints are to be tightened or disconnected

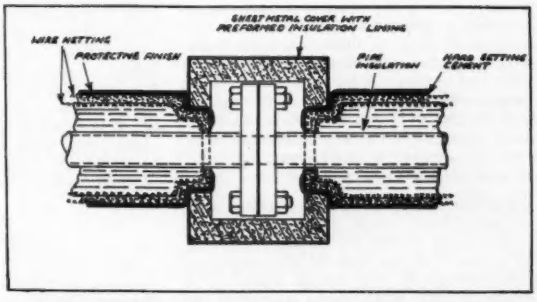
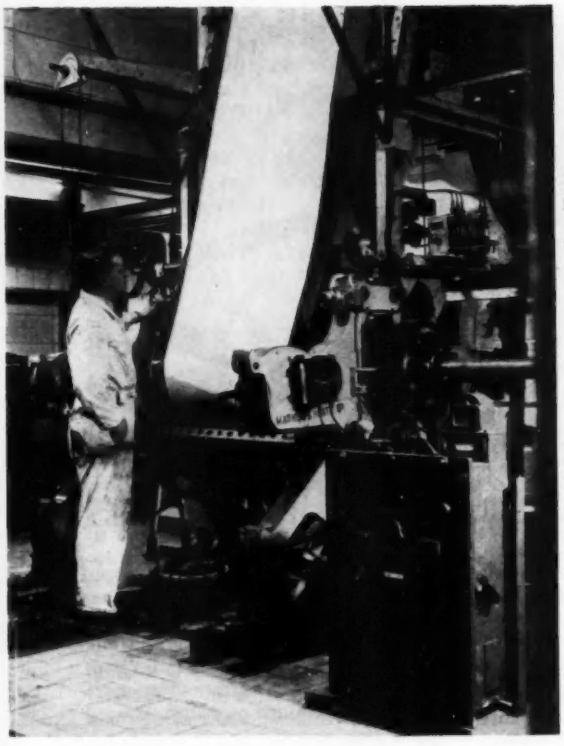
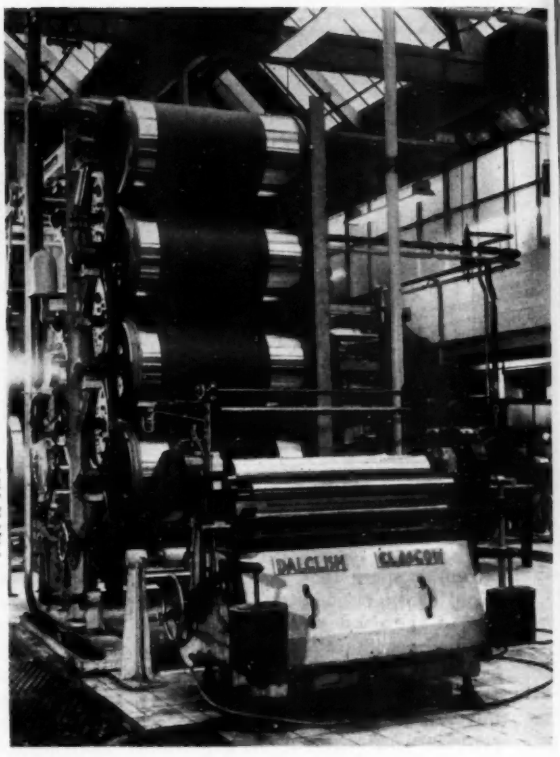


Fig. 13. Pre-formed slabs are often used for the lining of removable sheet metal covers for the insulation of flanges, valves, manholes, access doors or any equipment subject to frequent inspection



(left) Mather and Platt's four-colour printing machine (courtesy, Manchester College of Science and Technology)



(right) Dalglish two-bowl pad and drying cylinders for glycerine finishing (courtesy, Manchester College of Science and Technology)

Glycerine and Its Derivatives in Textiles

By G. MACHELL, B.Sc., PH.D.

GLYCERINE has been used in the textile industry for nearly one hundred years, the first recorded application being in the manufacture of muslin. During this time many other uses for this well-known compound have developed in the field of textiles. Although the name glycerine is in general use, the compound should be called glycerol, since chemically it is a trihydric alcohol. Glycerine occurs in nature as a component of fats and vegetable oils, and is produced commercially in large amounts when these fats and oils are hydrolysed in the manufacture of soap. Pure glycerine is a colourless, viscous, hygroscopic liquid with a specific gravity of about 1·26, and a high boiling point, 290°C. It is miscible with water and simple alcohols, but not with hydrocarbon type solvents.

Glycerine is also produced synthetically from propylene, itself derived as a by-product of the petroleum industry. In this brief account of the uses of glycerine and its derivatives in the textile industry, a number of applications must inevitably be omitted, but the wide variety of those discussed is a measure of the versatility of these compounds.

Conditioning Yarns

In the conditioning and setting of twist in weaving yarns, the usual procedure is to treat the yarns wound on bobbins or other packages. This conditioning is speeded up by the addition of glycerine to the water; the additive also gives a weighting effect and maintains a more constant regain. In this application, the glycerine serves as a substitute for water with the advantage that it does not evaporate before the twist of the yarn is properly set.

A similar application for glycerine is found in spinning knitting yarns on both the Bradford and French systems. Again the glycerine remains in the stock to give the fibres the required flexibility. At the same time, the presence of glycerine helps to decrease static changes, owing to its hygroscopicity, that is its water-binding properties.

Sizing Yarns

The object of sizing a yarn prior to weaving and knitting is to cause all the fibres to adhere together to give a smooth, strong thread, better able to withstand the fraying action of the healds and reed or knitting needles. The main constituent of the size is an adhesive, such as gelatine, maize starch or sago. A softener is also required to counteract any harshness of the yarn produced by the adhesive, and to lubricate the yarn to facilitate its passage through the various machines. Finally, an antiseptic may be needed to prevent any tendency of the yarn or cloth to develop mildew growth. Glycerine is employed as a softener in sizes, and also possesses mild antiseptic properties; however, this antiseptic action normally requires reinforcing by some conventional antiseptic.

Glycerine appears to be specially recommended in the sizing of rayon yarns, where the size must be pliable to permit full flexibility to the filaments without cracking taking place. A typical size for cellulose acetate is:—

Gelatine	45 lbs.
Glycerine	6 lbs.
Water	100 galls.

The sizing of woollen and worsted yarns is not uniformly practised, as the need for softeners, etc., is much less than with cotton. However, where sizing is required, glycerine is often used to impart softness.

Sizing is also needed for the synthetic fibres nylon and "Terylene," but direct

application of sizes such as gelatine/glycerine is not feasible. However, if the yarn is precoated with about 1% tannic acid, the adhesion of the size is much improved. It is probably better practice to size these hydrophobic fibres with polyvinyl alcohol or other synthetic polymers. Polyvinyl alcohol sizes often contain glycerine also in order to control the sensitivity of polyvinyl alcohol to water.

Dyeing and Printing

The use of glycerine as a solvent and moistening agent in commercial dyes dates back to the last century. Glycerine is still incorporated into many dyestuffs which are marketed as pastes, since it prevents the dye paste from drying out or freezing in cold weather. During subsequent dyeing the water miscibility of the glycerine and its solvent action on many dyestuffs aids in dispersing them in the dyebath, while on account of its affinity for textile fibres, glycerine serves as a dye-levelling agent. Glycerine is sometimes used as an assistant in dyeing with naphthol colours, where it improves the stability of the naphthol solution.

The majority of the glycerine consumed by the textile industry finds its use in printing pastes. Glycerine is probably the oldest constituent used in formulating printing pastes for all classes of dyestuffs and fabrics, and is still very widely used. A typical vat printing paste is made up as follows:—

Starch	6%
British gum	6%
Soda ash	13·5%
Sodium formaldehydesulphoxylate	12%
Glycerine	6%
Water	56·5%

The precise functions of the glycerine in such a composition are of interest. Its hygroscopic properties are important in the printing of vat colours where, during steaming, a dyeing medium must be maintained for the reduction of the colour and its absorption by the fibre. The solvent action of glycerine is also important because in printing a high proportion of dye is employed, and the water alone is usually inadequate as a solvent. As a polyhydric compound with wetting and lubricating properties, glycerine aids in producing smooth pastes which clear completely from the printing rollers. By swelling and penetrating the fibre, glycerine also improves levelling and penetration of the pigment or dyestuff. This action is particularly evident in the case of materials that do not absorb colour readily, such as threads under high tension or fabrics containing high-twist thread.

The importance of glycerine in textile printing is well illustrated by its widespread use in the printing of cottons, where glycerine helps in the attainment of the best results with direct and acetate colours. Glycerine also improves discharge and resist printing methods, the following recipe giving a typical stock paste:—

Wheat starch	70 g.
Tragacanth thickening	130 g.
British gum	70 g.
Glycerine	80 g.
Sodium formaldehydesulphoxylate	80 g.
Potash	120 g.
Textile printing oil	20 g.
Water	130 ml.

Many resist whites are made with a zinc oxide paste prepared from zinc oxide, glycerine and gum tragacanth. The resultant paste is mixed with sodium acetate and/or soda ash and/or sodium sulphite. Coloured-resist recipes are made up from this paste and the vat or azoic dyestuff.

In the vat printing of rayons many typical formulae contain 3% of glycerine, and glycerine is frequently used in standard printing pastes for woollen and woollen blended fabrics. It may be employed with acid colours, vats or chrome dyes. Formulations intended for the vigoureux printing of wool/rayon-staple mixtures with mixtures of acid and direct dyes, incorporate 4% of glycerine, a slightly smaller amount being used with chrome or direct dyes. The primary function of the glycerine in these applications appears to be the prevention of drying out of the printing paste prior to steaming.

Glycerine is also used in the printing of acetate rayon and the new synthetic fibres. Acetate dyestuffs are often incorporated into the printing paste by mixing with a suitable thickener and a little glycerine. The glycerine promotes uniform wetting and thus helps to overcome the water repellency of cellulose acetate.

Finishing

The physical properties of fibres are strongly influenced by their moisture content, a less rigid and thus softer product being obtained if the fibre swells with increase in mosture content. Glycerine is frequently used as a softener since it is capable of absorbing a large amount of moisture from the air, with consequent increase in the softness and flexibility of the material. The handle and lustre of the material are also improved by adding glycerine, the amount required being generally less than 1%.

Alkyd Resins

Alkyd resins are produced by the reaction of dibasic acids or their anhydrides with polyhydric alcohols, a typical example being the resin obtained from glycerine and phthalic anhydride. This is one of the most widely used alkyd resins, and its manufacture represents one of the major outlets for glycerine. Although there is little application in the textile industry for the simple alkyd resins, modified resins are used on a considerable scale. These modified resins may be divided into three main groups:—

(1) Those which undergo further polymerisation on heating to give insoluble products.
(2) Those which undergo oxidative polymerisation with the same result.
(3) Resins which remain relatively unaffected by heating or oxidation.

All these modified resins may be applied to textiles from solutions in organic solvents or as emulsions, and subsequently converted into insoluble products. An example of category (1) is a urea-formaldehyde-castor oil modified alkyd resin, which after padding and stoving gives a stiff, water-repellent finish. A linseed oil-soya bean oil-modified alkyd resin gives a fairly stiff finish of class (2), while a stearic acid-coconut oil modified resin, typical of class (3), gives a moderately stiff, water-repellent finish with fair resistance to washing.

Certain alkyd resins require stoving at 180 to 210°C. to complete their polymerisation, and are obviously unsuitable for general textile use. However, such resins are soluble in alkalies, and give hard, shellac-type finishes, which are employed in hat stiffening.

Probably the most useful type of alkyd resin for the textile industry is the urea-formaldehyde non-drying oil-modified resin, which is soluble in ammonia and triethanolamine. As already noted, this type of resin produces a stiff finish with resistance to washing, and is also used to enhance the resistance to washing of mechanical finishes such as embossing. The use of up to 5% of this resin gives a full-bodied finish to cotton or linen piece goods, and can be incorporated with the usual fillers if necessary. Of course, these modified alkyd resins have to compete with much cheaper products such as starch, or (for book-cloths) either starch or casein, but the alkyd resins have the advantage of giving more durable finishes.

Transparent Finishes

There has long been a demand for transparent or translucent textile materials for wearing apparel, raincoats, hats, etc. This demand is partly met by the use of drying oils, but oil-modified alkyd-urea formaldehyde resins are superior in colour stability and freedom from tackiness. It is necessary, however, to apply up to 200% of resin to the fabric, often with repeated impregnation, and then to dry the resin in a tower by hot air until it is no longer tacky. This process is suitable for silk or viscose rayon, but not for acetate rayons.

Pigment Printing

Urea formaldehyde non-drying oil modified alkyd resins are used as binding agents in the production of pigment and delustre prints. The resin is dissolved in triethanolamine, to which the pigment and delustrant are added. After printing, the fabric is dried and fixed by baking or steaming. Such pigment prints have excellent fastness to washing on cotton and viscose rayon, but the process is unsuitable for cellulose acetate.

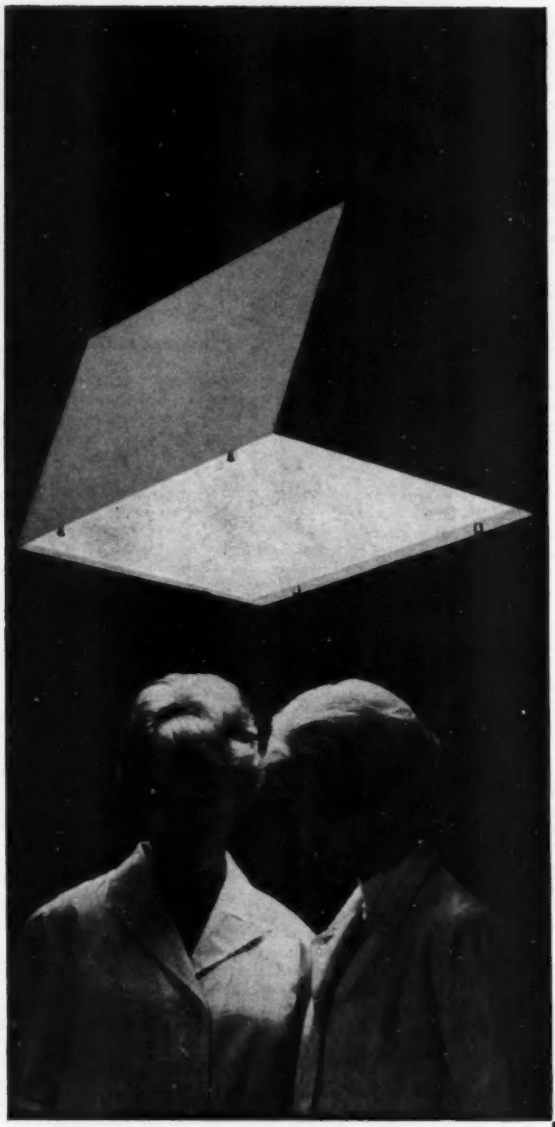
Miscellaneous Applications

Glycerine is employed as a clarifying and brightening agent for the "soluble" or emulsifiable oils, which are used for lubrication, soaking, throwing, knitting and finishing. It promotes mutual solubility of the ingredients and finer, more stable emulsions in water. Glycerine is incorporated as a non-toxic solvent and lubricant into a wide variety of dry-cleaning mixtures, where it aids in the wetting and suspending of insoluble strain particles. It is also used in the synthesis of benzanthrone, an important dyestuff intermediate, and in the manufacture of a number of anthraquinone, alizarin and indanthrene type dyes.

Glycerine and its derivatives are used in the preparation of a large number of surface-active agents possessing emulsifying, wetting and detergent action, and textile auxiliaries such as solvents, softeners and reducing agents. Some of the former class are, of course, made directly from fats and oils, an example being Turkey Red oil, while others are prepared from glycerine and fatty acid derivatives. There has been a revival of interest in soaps as textile softeners since the discovery that blends, such as sodium stearate with glycerine mono-stearate and similar compounds, impart a smooth, bulky handle to bleached cottons and rayons without dulling the clarity of the bleach or changing the brilliance of optical bleaches.

Acknowledgments

Thanks are due to Courtaulds Ltd. and I.C.I. Ltd. for supplying information.



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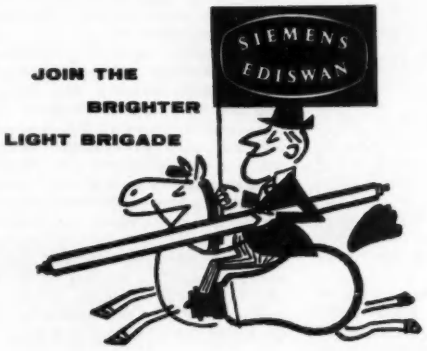

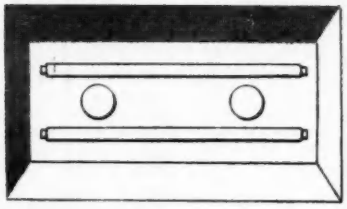

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The scene at the opening of the Cotton Board Conference, held at Harrogate. Lord Rochdale, Chairman of the Cotton Board, is seen addressing the delegates. With him are members of the Board and textile union officials

A Producer Looks at Marketing

By C. E. HARRISON*

I WELCOME the opportunity, in collaboration with Mr. Blackburn, to look at marketing problems in greater detail but before doing so I would like to add a few additional general observations.

(1) The horizontal structure of the industry has made it relatively easy for Asiatic Commonwealth producers to capture Lancashire's trade, at home and abroad. We have, in effect, handed to them free of charge, the whole of our merchandising experience and connections. Because the Manchester textile merchant has, through the years, increasingly bought fabrics to technical specification, it has been very easy to transmit this knowledge to our competitors. The merchant having no long-term investment in plant and people tends to think and act on the short view and indeed it is difficult to see how he can do otherwise. Consequently, once supplies of cheap cloth from Asia became freely available all the converting "know-how" was available to the Asiatic producer.

If marketing and distribution had been more closely connected with production, the capture of Lancashire's trade would have been slower and much more difficult. So long as there is no direct community of interest between producer and merchant/converter all attempts to bring production more into line with demand will only increase the merchants' efforts to find supplies outside Lancashire.

(2) Modern production techniques require continuity of demand and lead to a relatively inflexible production. This requires a flexible marketing policy. In a horizontally organised industry, merchanting policies tend to be inflexible and the need for flexibility is thrust back on to the producers. There is a world of difference in the effect of policies designed to give economic production and the effect of policies which ignore production problems.

On the question of the best organisation for the production and marketing of Lancashire's products there are many views within two extremes.

One extreme is the school of thought which believes Lancashire's industry was built up on specialisation and that this is the most effective form of operation. They believe the industry's affairs can best be conducted on the basis of a horizontal division of the various functions, spinning, weaving, finishing, etc. As under this form of organisation the spinner, the weaver and the finisher in effect sub-contract to another party, the profitability of their operation depends on two factors: (*a*) being able to produce more cheaply than one's competitors, or (*b*) trading in a market where supply tends to fall short of demand.

Unfortunately the wage and labour utilisation policies pursued in the period of post-war boom mean that for a large range of productions re-equipment does not reduce costs—for many cloths—it increases them. There is a great need for a change of attitude

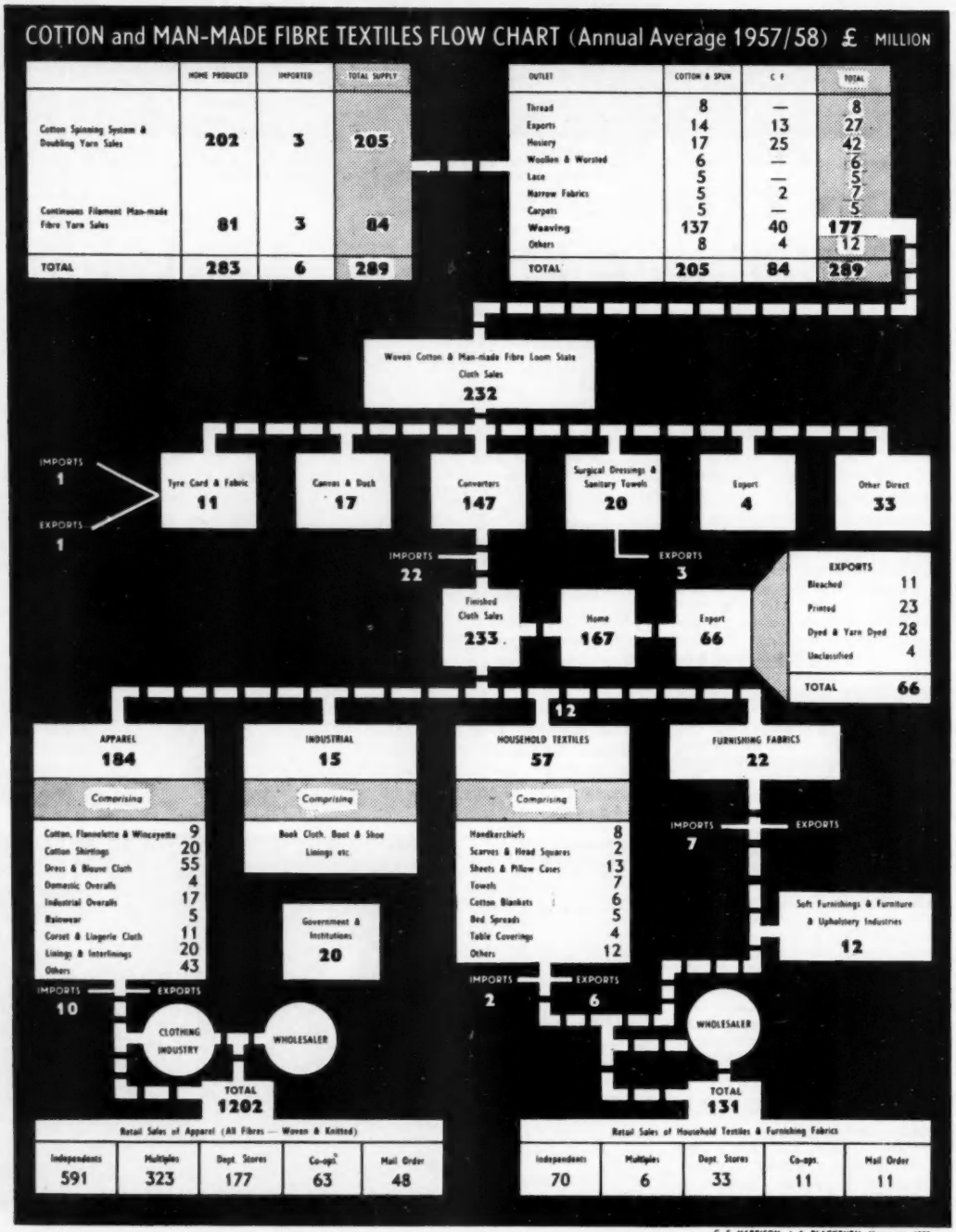
Photographed at the conference were (l. to r.) Mr. J. A. Blackburn, Mr. C. E. Harrison and Sir Ernest Goodale, C.B.E., M.C.

* *Vice-chairman and managing director, English Sewing Cotton Co. Ltd., and president, Manchester Chamber of Commerce. (Assisted by J. E. Blackburn, economist, English Sewing Cotton Co. Ltd.)*

on the part of employers and employed.

So long as the industry is organised in horizontal groupings the profitability of the various sections depends on there not being a surplus of production sufficient to depress selling prices below cost of production. Hence in a time of falling demand, sectional price maintenance or monopolistic thinking flourishes.

Both arguments may be valid in certain types of trade. The vertical integration of spinner-weaver-finisher can only be carried out with reasonable safety where there is a prospect of long-term continuity of demand and where there exists the opportunity to control distribution to the point of retail sale. Close integration in some fields—particularly where there is a strong fashion element—can be extremely dangerous. Developments within the industry show clearly that these points are fully appreciated by those engaged in it. The tendency to generalise about the industry leads to many misconceptions. It is not one industry but a series of separate industries employing, on the whole, the same machinery and techniques but producing a wide range of products each with its own best form of operation.



Our present approach to the problems of marketing is, therefore, to consider the steps necessary effectively to produce and sell particular articles. We start by asking you to consider our flow chart which, commencing with spinning, seeks to show where production goes and the relative importance of the various outlets. (We have chosen sterling values as the most effective measure.) The chart is a first attempt and we hope that constructive criticism and the collaboration of interested parties will produce a more informative picture. It is based on such figures available to us for 1957 - 58 and is of necessity a static picture, whereas the situation it seeks to depict is fluid and dynamic. Fuller consideration must be given to certain pronounced trends but for our purposes today we feel it wise not to confuse the presentation.

The total supply of yarn available is shown as £289 million of which £177 million or 61% goes into weaving and the rest into other outlets. Of the other outlets it is broadly true to say that in the few instances where integration of spinning with subsequent processing is desirable (as for instance in thread manufacture) a considerable degree of vertical integration already exists. There are, however, few outlets where such integration is of value and in industries such as hosiery, narrow fabrics, lace, etc., there is a close degree of technical co-operation which probably gives the best arrangement possible. We have found a similar state of affairs in the U.S.A.

The total of cloth sales (loom state) is shown as £232 million of which £147 million or 63% undergoes conversion in the conventional sense and the rest sold to industrial and other consumers. In respect of the balance of 37% it is broadly true to say that the relationship of the cloth producer to the consumer is direct and there is close technical co-operation. We cite as examples surgical dressings, tyre fabrics, canvas and duck.

Converters' sales at £233 million (which covers home-produced grey cloth, imported grey cloth, finishing and conversion costs) are divided as to £167 million (or 71%) for home trade and £66 million (29%) for export. Available statistics do not allow of detailed analysis by types or outlets for home and export but we show the broad groupings of outlets for the combined home and export figure and for this purpose we add household textiles, a large proportion of which is handled by converters. The various outlets are roughly as follows:—

Apparel fabrics ..	**£184 million**
Household textiles ..	**57 „**
Furnishing fabrics ..	**22 „**
Industrial fabrics ..	**15 „**

The final table shows the value of apparel sales and household textiles by main retail distribution channels. It is clear from the chart that generalisations can be dangerous. For example, the industry is constantly urged by its advisers from the "side lines" that its salvation lies in improved style and design, in market research, in modern promotional methods and so on.

We hope that the picture presented will enable critics to take a more balanced view of our activities and needs. Forty per cent. of our yarn production must be regarded as a subcontractor's operation and nearly 40% of the cloth woven from the remaining 60% falls in the same category. So far as style and design are concerned the total consumption of machine prints for all purposes in the home market, garment, furnishing fabrics, etc., only accounts for about 10% of the yardage in supply in Lancashire (yardage is not a fair measure but we have to use it in the absence of any measure of value added).

We do not want this comment to be interpreted as denigrating in any way the importance of prints as an outlet. Marginal differences in volume make all the difference between profits and losses and we must not underrate the importance of each component. Furthermore, prints and design cloths have a greater importance than can be measured by statistics. They are, as it were, the industry's shop window and they are the main criterion by which the industry is judged by the bulk of its customers. We are fortunate in having a number of firms doing an outstanding job which reflects to the benefit of all. The point we stress is the need for a less partisan and more balanced approach. If we can get away from sectional thinking we may get a greater degree of agreement on such varied problems as sales promotion, certificates of origin and cloth imports.

It is broadly true to say that where fabric appeal and usefulness rests mainly in spinning and weaving and where finishing is a simple process, a substantial amount of the trade is done by the weaver doing his own converting and sale to maker-up, wholesaler or retailer. This applies to household textiles, furnishings, flannelettes, linings and industrial cloths.

Pattern of Distribution

Where the fabric is merely a vehicle on which the finisher exercises his skill and where fashion and design call for the exercise of qualities of judgment and taste, the largest volume of trade is done by sale of grey cloth to converter. The converter may be a calico printer with heavy investment in plant, a processor by other means or a merchant/converter not being directly connected with production. Experience shows that this is not a fortuitous growth but is based on sound commercial reasoning. The largest outlets for converted cloth are apparel, household textiles and furnishings and we want now to consider the present pattern of distribution.

Two major developments in recent years are the growth of factory-made clothing with the consequent decline in home and bespoke garment making and the concentration of a large volume of retail distribution into a few channels. The effect of the growth of factory manufacture of clothing has meant the loss of identity of fabrics. The establishment of brand names with the public has largely switched to the made-up article and the choice before the producer of fabric has been to accept a position of anonymity, or to associate himself with the manufacture of garments, or to put his selling and production effort into those articles which lend themselves to consumer publicity.

The concentration of a large volume of sales in the hands of a few retailers arises from the rapid growth of chain stores, mail order business and financial grouping of department stores and other retailers. The effect of this concentration cannot yet be fully assessed as we have not yet seen the full development. Such effects as are measurable indicate some gains in efficiency and some losses in power and influence for the producer. We do not attempt to draw up a balance sheet but mention points of importance.

Distribution of standardised, quality controlled products produced in bulk and marketed efficiently has meant an immense gain to the consumer. It has brought attractive articles at modest prices within the reach of the mass of our people. By stimulating and expanding demand it has conferred great benefits on the producing side. For the producer it has meant bulk production with conditions that suit admirably the needs of modern production methods.

For the producer there are, however, serious disadvantages. There is the enormous impact on the price and production structure of fluctuations in buying policy on the part of big consumers. A decision to go "long" or

"short" has a profound effect on producers' order books. The canalisation of consumer demand through few channels means that the interpretation of demand trends is left to few people and their decisions not only affect production and stocks but, by withdrawing lines from sale, materially affect consumer demand.

There is the complete loss of the individual producer's identity. His products become anonymous and he cannot build up the protection of public goodwill. Although some distributors are willing to market established brands for prestige reasons the bulk of sales are under the retailers' own brands and the tendency to suppress producers' brands and increase retailers' brands is growing. Producers are increasingly dependent on the favours of a few buyers and this is not a healthy state of affairs or a basis for heavy investment.

There is evidence that the concentration of control of large department stores and independent retailers is leading to a progressive lowering of standards in quality merchandise. High class specialist producers of furnishing and other fabrics are losing retail outlets which formerly were concerned to attract the discriminating buyer but now want fast selling, large volume, lines. There is also the increasing tendency to push back on to the producer the stock carrying and financing function of the wholesaler.

The change in the pattern of retail distribution at home and abroad is the most significant development of recent years. One would have expected changes in the structure of wholesaler - independent retailer to meet this challenge. In Western Europe the challenge has been met—we believe successfully—by co-operative buying on the part of retailers. We know of no large-scale similar development for textiles in this country. At the other end of the production chain the supply of a large part of our raw materials—synthetic yarns and fibres rests, for technical reasons, in the hands of a few large suppliers. We are, as spinners, weavers, finishers and converters, between the upper and nether millstones of a few large suppliers and few large customers.

Our comments thus far have been concerned with the home market and we have not made reference to export trade. The reason for this is that we see our future export trade as being, not the bulk export trade of past years, but, in the main, the export of goods of similar type to those produced for the home market and consequently, policies at home will vitally affect our export performance. We would not have you think that we underrate the possibilities and the value of doing an export business. Despite the long-term decline in the volume of cotton and man-made fibre fabrics entering international trade and a marked change in the number and performance of the supplying countries, the volume has remained remarkably steady in recent years.

An interesting and significant fact of the international trade in textiles is reflected in a change which economists have noted in other fields, i.e. whereas formerly export trade consisted largely of manufactures from industrialised countries to under-developed countries there is marked growth of import/export between countries with a high degree of industrial development. An enquiry into export trends in textiles would, we believe, show a significant development in this direction.

There is business to be done in fabrics which will sell on merits other than those of low price. There is growing concern in many importing countries about the dangers of increasing dependence on Asiatic supplies with the corollary of a need for an increasing flow of goods in the reverse direction. The rising standards of life in many countries, particularly Western Europe, offers us many opportunities. To do business, however, we shall require drastically to revise our recent trading methods. The volume of business likely to be available is not big enough to support large numbers of exporters each with large numbers of agents. Unless we concentrate our efforts we shall be unable to afford to employ and remunerate first-class representation in many markets. We shall add to present disadvantages the handicap of inadequate representation and sales effort.

A sound appraisal of export prospects would require a detailed examination of conditions in many countries and this is a major study in itself. We must content ourselves at this stage by saying that despite our difficulties and the enormous contraction that has taken place we still export £93 million of goods (including re-exports) and we cannot afford to lose these exports. Given the right policies we have good prospects of doing a worth-while and remunerative business.

We conclude by putting forward some of the tentative views at which we have arrived.

(1) The Lancashire textile industry is probably the only major industry which does not exercise effective control over the sale of a major portion of its output.

(2) We cannot think in terms of an industry completely integrated on vertical lines. The chart shows that the spinning section sells about one-third of its output to users other than weaving and we shall always require spinners to distribute some of their yarn "horizontally." Similar considerations apply in weaving and finishing.

(3) In so far as the present horizontal structure arises from inertia rather than considered policy there would appear to be an overwhelming case for producers with heavy investment having better control of the sale and distribution of their products. If we cannot control our own merchanting we should at least see that we give support to those merchants who are concerned to sell Lancashire's products. In certain sections of industry we believe the independent merchant has a vital part to play but it is high time we sorted the wheat from the chaff.

(4) Although a proportion of production is sold direct to consumers the existence of a large body of traders dealing in anybody's products is harmful to the producing interests. It would be interesting to know how far the import of Asiatic cloths is damaging Lancashire's trade in industrial and other fabrics.

(5) The question of the best form of organisation cannot be decided by reference to the best conditions for any one stage of production and sale. What may be good technically for the spinner, weaver or finisher may not be good commercially for the merchant function and it is the job of management to decide where the balance of advantage lies for the whole operation.

(6) The concentration of buying power in few hands and the very heavy investment required for the production of most of our synthetic raw material will accelerate the present trend to fewer and larger firms in the intermediate production stages. This will come in various ways; by the growth of some firms and the decline of others, by amalgamation, by absorption, etc.

(7) Increasing attention will have to be given to market research, promotion, sale and distribution. We must pass from the attitude of trying to sell what we want to produce to the management approach which finds out what consumers need and then shapes production to meet it. From this will spring efforts to educate the consumer to new wants of which he is not conscious at present.

A good deal of industry promotion is of doubtful value because promotion to be successful must be carried out under close and specific terms of reference by organisations whose production and distribution are attuned to the end in view. Diffused effort on behalf of an amorphous mass of companies will not achieve results. Co-operative promotion linked to branded products may be a fruitful approach and

the current promotion being carried out by the Cotton Board in Australia should provide some interesting lessons. It is difficult to measure the effect of promotion efforts but an attempt must be made to get a factual valuation. We think there is great promise in the sort of thinking contained in the chairman's speech to the stockholders of Courtaulds when he announced the establishment of a marketing division. A great deal of progress has been made in the U.S.A. and we should draw on their fund of knowledge as much as we can.

(8) Expenditure on research by companies and by industry associations must be directed increasingly to product development and market research rather than to research into better methods of production.

(9) As an industry we must put more effort into the study of market opportunities so as to be able to advise exporters, if necessary, on a confidential and selective basis.

(10) We must make fuller use of information accumulated by the Cotton Board and Government agencies. For example, has any serious attempt been made to compare the relative production efficiencies or marketing successes of the various firms in the industry?

(11) If the present organisations of wholesale-retail are not experimenting with methods to make their distribution as effective as those of chain stores, may we not have to consider co-operative marketing and sale? This would present some difficult problems. Anyone with experience of sale to retail knows how difficult it is to get effective operation at bearable cost and some degree of co-operative sale and distribution appears to be essential.

(In parenthesis it is interesting to note how the meaning of words changes. Wholesaling used to mean bulk purchase and small distribution. To many wholesalers today it means membership of an association and is not related to function.)

(12) Can we really hope to make effective progress when the handicaps to those seeking productive efficiency are so great? Must we not get together to consider how to make re-equipment and new methods really worth the effort and risk?

(13) In our export markets must we not channel our sales efforts through fewer representatives and be prepared to pay adequately for the best men? Two developments in which we have been concerned are full of interest. One is the establishment of a consortium of four firms to seek trade in Russia. We think the idea is an excellent one and that we shall profit by establishing consortia for certain markets and for particular export opportunities.

The other is an arrangement between two firms to cheapen the cost and make more effective an effort to sell Lancashire goods in the U.S. market.

Both are evidence of the best form of co-operation and should provide valuable experience. There must be hundreds of similar arrangements that we should be studying.

Finally, I want to stress that success or failure will depend on the quality of the individuals who serve the industry. Is senior management today providing the conditions which will attract the personalities we so badly need? Despite the good work done by many firms I see no evidence of any full scale attempt to attract, and to give authority to, sufficient young men of the calibre demanded by the tasks ahead. Merchandisers, salesmen, advertising men are the people who will keep our spindles and looms running or stopped. Have we got these men and are we really trying to get and hold them?

The Chamber of Commerce movement has established a commercial apprenticeship scheme and many able men have given a great deal of herit time and thought to making the needs known and offering a solution. The response in Manchester has meant a total of 17 apprentices. In Glasgow there are 44 apprentices. Is the need in Manchester so much less than in Glasgow? Measured against needs what a pitiful response! How many senior executives are taking an interest in and supporting organisations like Manchester Junior Chamber's excellent textile study group? I have spent my working life in Lancashire textiles. Despite its experience, despite its so-called action groups and vocal reactionaries, it is still a great industry with lots of exciting possibilities.

Table 1. Retail Sales of Apparel Textiles

	Men's and Boys' Wear			Women's, and Infants' Wear Haberdashery and other drapery goods		
	1950	1957	% Change	1950	1957	% Change
	£m			£m		
Total ..	308	402	+ 31	581	799	+ 38
Independents ..	164	197	+ 20	306	395	+ 29
Multiples	92	136	+ 48	123	187	+ 52
Dept. Stores	24	31	+ 29	106	146	+ 38
Co-ops. ..	23	25	+ 9	34	37	+ 9
Mail Order ..	5	13	+160	12	34	+183

(Source: Census of Distribution)

Table 2. Sales of Wholesale Textile Houses 1957 compared with 1950

Men's and Boys' Wear	— 1%
Women's, Girls' and Children's Wear	+ 1%

(Source: Wholesale Textile Association)

Table 3. Number and Size of Converters

Size of Firm	Number of Firms	Deliveries in 1958 M. sq. yds.
Up to 10,000 sq-yds. ..	100	—
10,000 to 100,000 sq. yds. ..	416	19
100,000 to 1,000,000 sq. yds.	629	256
1,000,000 to 2,000,000 sq. yds.	136	196
2,000,000 to 4,000,000 sq. yds.	106	300
4,000,000 to 10,000,000 sq. yds.	70	415
Over 10,000,000 sq. yds. ..	36	842
	1,493	2,029

(Source: Cotton Board)

Trade Literature

BUTTERFIELD NEWS. A somewhat belated summer number of this bright little journal is available on application to W. P. Butterfield Ltd., Shipley, Yorks. It contains several general interest articles, a collection of company news items and two very delectable pin-ups.

* * *

PROBLEMS OF JUTE CULTIVATION. A recent number of "Tropical Science," the quarterly journal of the Tropical Products Institute contains an article especially interesting to the jute industry. Entitled "Problems of Jute Cultivation," by G. D. Baxter, the article describes methods of jute cultivation on the varying types of soil in British Guiana.

* * *

INCANITE CASTINGS. Designed to indicate a few of the many applications of "Incanite"—the special process cast iron—a new series of leaflets have been produced by The Incandescent Heat Co. Ltd., Cornwall Road, Smethwick, Birmingham. Their serial numbers are IN. 1, 2, 3, 4 and 5.

* * *

FIRE BIBLIOGRAPHY. Fire Research Station, Boreham Wood, Herts. References to Scientific Literature on Fire, Part 9, is a credit to its compilers; Miss E. M. Shakeshaft and Mrs. B. F. W. Rogowski; hours of exhaustive searching must have been necessary before this excellent work left the presses. 1,071 references are split into several sections, and useful name and subject indexes make the work quick and easy to use.

* * *

STURTEVANT FANS. Sturtevant Engineering Co. Ltd., Southern House, Cannon Street, London, E.C.4, have released a new publication dealing with type MVAZ multivane fans, a type extensively employed with installations for heating and ventilation, air conditioning plants, drying, fume exhaust and boiler draught. Construction and methods of driving are discussed together with fan selection and extra fittings. Comprehensive capacity tables are included.

* * *

CONVEYOR BELT REPAIR. A new technique in conveyor belt repair is claimed to have been evolved by Stenor Ltd., Richmond, Surrey. The repair is said to be absolutely flush with the cover and as strong as the remainder of the belt. A leaflet, now available from the above address describes the "Stenorization kit," and methods of application for the various types of belt damage likely to be encountered.

* * *

STARTING FROM SCRATCH. Fully revised and brought up to date, the reprinted edition of this pocket history of Higgs Motors Ltd., Witton, Birmingham, provides a wealth of useful information of considerable value to anyone connected, however remotely, to this progressive Midlands company. Company personalities are featured and the company's history traced from 1912 to the present day.

* * *

HIGH ACCURACY RELAYS. Data sheet OR/UR, published by Elcontrol Ltd., Willbury Way, Hitchin, Herts., lists applications for current overload and underload relays and describes briefly the operation of the units. Specifications and illustrations are also included.

Factors Affecting Warping Efficiencies in Terry Cloth Manufacture

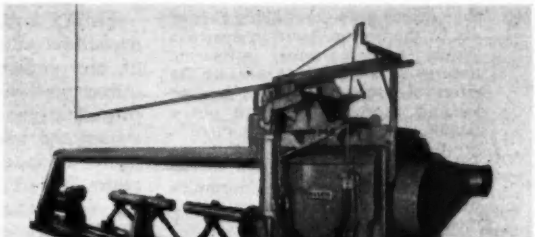


Fig. 1. Model H-3 high speed heavy duty beamer accommodates one, two, or more loom beams at once (Allen Warper Co., Massachusetts, U.S.A.)

Recent developments in creels, tension arrangements, speeds and capacities

By T. HARGREAVES

SHORT runs of a wide range of cloths is one of the many problems which manufacturers have to contend with at present. To terry cloth weavers it is particularly aggravating in the efforts to decide the most efficient manner for warping both the pile and the ground beams to keep loom stopped time to a minimum. It is no easy task in view of the multiplicity of types, counts and colours of yarns usually involved, including single, two- and three-ply yarns, condenser types (grey, bleached and coloured), linen yarns, novelty types and others. Another factor is the considerable differences in the widths of beams that have to be warped, varying from about 27 ins. between flanges up to 54 ins. and sometimes over in certain special cases. Yarns never improve by being handled or passed through too many processes; every process increases both cost and the amount of stopped time, and waste percentages.

Years ago, warping speeds of 40 to 80 yds./min. were common practice, winding from bobbins or cheeses, but 360 to 400 yds./min. is now frequently carried out warping from cones. As a matter of interest, 900 to 1,000 yds./min. is common-place when warping from cakes as in the Barber-Colman system but this must be run in conjunction with the company's special automatic cake winding machine. Warping techniques are doubly important to terry cloth manufacturers and it is extremely important that managements select the methods best suited to their special requirements

One method, perhaps more popular than any other was to unroll the yarn from bobbins or cheeses held in a V-creel on to the weavers' beam carried in the standard 9/8s warping headstock. The drum driving the beam would often be designed to expand or contract in order to accommodate the size of beam being run; alternatively, it might be fitted with a drum which had been cut down width-ways to fit the prevailing narrow loom beam. The creels would be non-magazine type limited to a capacity of 600 bobbins or cheeses. Apart from the slow nature of the operation — 40 - 80 yds./min. — the question of re-winding of yarns could not be lightly ignored.

A considerable amount of re-winding was unavoidable in using up the yarns left on bobbins. In many instances, new yarn would be wound on to the old to re-fill the bobbin—a practice which could lead to disastrous results if there was, for example, a slight difference in colour shade. Short lengths of left-over yarns from cheeses can, of course, be recovered by re-winding them into normal-sized cheeses to be used again. It must also be remembered that to continue warping from remnants of cheeses in the creel is to invite trouble from over-running and yarns becoming entangled especially during starting and stopping. Running in this fashion is both costly and slow and the quality of the warp suffers through broken or crossed ends.

In some cases a larger type creel up to 1,200 cheese capacity was employed in conjunction with a dry tape headstock to run beams for the wider types of looms. It still had the slow of 40 - 80 yds./min. with hand-controlled speed range by means of two cones. Further, as the machine was spindle driven the running-off speed of the cheeses increased as the beam built-up and the cheeses got less in size. Over-running and entangling of yarns was frequent and more than off-set any advantages gained by the higher speeds. In addition, the problem of "left-overs" still remained.

Magazine Cone Creels

The introduction and further development of this type of creel has been a tremendous help to the manufacturer. Designed for over-end winding, it completely eliminates the problem of cheeses or bobbins jumping out of the creel. Similarly, re-winding was no longer necessary in that as each cone became exhausted it was automatically replaced by a reserve cone already in the creel.

Instead of the previous 80 yds./min. warping speed, 360 to 400 yds./min. at once became available but this was not without its problems. To stop the machine when the stop-motion indicated a broken end took a minimum of 5 yds., but with an inefficient braking system it might mean as much as 8 to 10 yds. Broken ends could be lost on the beam because in many cases the operator would not be able to find them for piecing-up.

The hair-pin type of drop-wire which fell between two rollers to stop the machine mechanically proved too slow in operation and was replaced by drop-wires operating electrically to

stop the machine. Even with this more efficient method a minimum of 5 yds. running occurred after the drop-wire had made contact before the drum was completely stopped. This type of drop-wire could not, however, be used with the reversing method of searching for the lost end, whereby several falling rollers were utilised to take up the slack yarn. Where falling rollers were dispensed with, a space of 5 yds. was allowed from the apex of the creel to the line of the front wraith in the headstock.

With the tension devices close to all the cones in the creel, and no tensioning rollers in the headstock, breakage of an end allows the drop-wire to contact the solenoid and activate it to stop the machine. Theoretically, if the brakes operated at maximum efficiency, the machine would stop within 5 yds. In practice, however, many things could arise to prevent or delay the drop-wire falling to effect instantaneous stoppage and broken ends could be lost on the beam in the best of regulated circles. When this happened some operators would scratch for the end but, instead of perhaps piecing it in the awkward position in which it might be found, they would unwrap it to gain the length required to effect "comfortable" piecing-up. It was a bad habit, giving rise to "crossed-ends" one or two layers below the rest. Electric broken-end stop motions installed at the apex of the creel finally overcame this problem. Still 5 yds. from the front wraith the motion, in effect, gained 5 yds. running time in order to stop the machine and lost broken ends were now virtually eliminated.

Making the best possible warp for either the slasher or the loom is probably the most important operation in cloth manufacture. Maximum loom and weaver efficiency is *not* determined by a stop-watch technique but by the efficiency and care employed in producing beams that will, in the slogan of one well-known firm of loom makers, "weave well alone." The stop-watch only records how well—or how badly—the warps have been made.

Even with the tremendous progress in recent years, there is still room for improvement in many textile processes. In warping, some types of yarn "balloon" much more than others and entanglements do occur at speeds over 200 yds./min., especially with linen yarns. With 2-ply cotton yarns similar conditions arise at speeds upwards of 300 yds./min. High speeds can also cause tension discs in the creel to jump up and fall to the ground. Any end running slack from this cause immediately allows its drop-wire to operate to give a "false-stop" and, by the time the machine has stopped, the slack end is often hard to find.

Faced with these circumstances, some operatives fall into the bad habit of keeping their feet on the starting pedal at the same time straining to locate the slack end whilst the machine continues to run. Often another end will break unobserved and become quickly lost in the running beam. A major improvement in connection with this was the introduction of signal lamps which show a bright red light indicating the row where slack, broken or incorrectly tensioned ends are located. As far as creels are concerned manufacturers should select those in which constructional arrangements prevent the tension discs jumping-off during warping.

Operational Flexibility

Only by studying closely the many factors involved in warping and the problems peculiar to terry weaving is it possible to decide which system—perhaps modified—will give the best results with operating flexibility. The average towel has 20 - 24 ends/in. Widths vary from 18 to 24 ins. with face cloths 12 ins. wide but woven two or three in the width. A minimum of 360 pile ends is therefore indicated for the 18 ins. width to 480 for the low reed 24 ins. towel, increasing to 576 in the case of the 24 end/ins., 24 ins. wide towel. It is customary to weave two towels 24 ins. wide, or four face-cloths 12 ins. wide, side by side in wider looms, e.g., 60 ins. reedspace. There may, however, be narrower looms to keep going where 24 ins. towels or two 12 ins. face-cloths need beams. Faced with these circumstances it is essential to have flexible warping arrangements which will deal efficiently with single, 2- or 3-ply cotton yarns, condenser types and linen yarns if required. It must also be capable of handling unsized pile and ground yarns for the weavers' beams, or make back beams for the slasher.

The headstock should be motor driven and equipped with a very reliable variable speed system to ensure constant yarn winding speed from start to finish of the beam. An excellent system is where the pressure exerted on the yarn during build-up is controlled by pre-determined hydraulic pressure. Equipped with push-button control for starting and stopping, the machine should also have simple controls for regulating pressure and

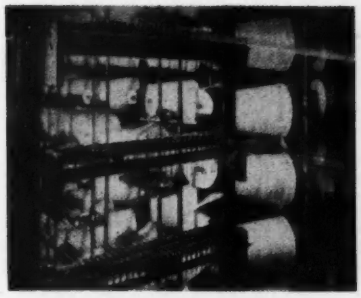


Fig. 2. Creel and stop-motion on Model H-3 Allen beamer

running speeds. The headstock should be able to accommodate 28 or 30 ins. dia. beam flanges and the broken-end stop-motion should have sufficient braking power to stop the machine in 4 to 6 yds.

Twin Creels

A headstock incorporating these stipulations is available for making the large size loom beams for weaving backing cloth for tufted and other carpets. It handles yarns of jute, linen, wool, cotton or "twisted paper" and with a few modifications could readily be adapted to the terry trade. This robustly constructed machine is very efficient and occupies no more space than other types of warpers. The headstock should be coupled with *twin* creels, each holding 640 cones of 4 lbs., measuring about 9 ins. dia. at the base.

With these large type cones there is less need for a magazine creel. A creel to hold 1,280 cones (640 in use, 640 in reserve) would be too big. The creel suggested would be a 640 non-magazine type and *twin* creels would allow 640 cones to be creeled while 640 in the other would be running off. Both creels would be equipped with double post tensioning arrangements for each end, each post fitted with washer and set-screw to prevent tension discs jumping off. Double post fitments provide a very wide range of tensions for many counts and types of yarn without having to change the discs.

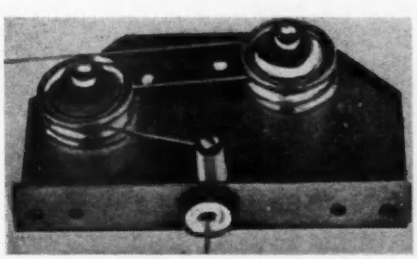


Fig. 3. Double post tensioning device (Allen Warper Co.)

Both creels would be identically equipped with electrical drop-wire and solenoid operated stop-motion with red signal lights to each row of drop wires for indicating broken or slack ends. To prevent the possibility of ends ballooning or "lashing," it might pay to study the idea of having alternate cones pointing in opposite directions. Spacing the cones in this fashion eliminates "lashing." It is a "must" where linen yarns are handled and very helpful when 2-ply cotton is being beamed.

It is advisable to have the twin creels set at an angle so that either (or both if desired) can be in use at the same time. One creel would be in use and the other undergoing re-creeling for narrow beams up to 640 ends. Both creels would be employed when wide warps up to 1,280 ends were required. A portable stand holding the old type of back warping wraith-placed near to the apex of each creel—should be used to enter the newly-creeled ends. When required, this is easily moved across the 4 - 5 yds. distance between the apex of the creel and the headstock to permit the ends to be transferred quickly to the laying-in reed in the headstock.

The construction of twin creels should not present any difficulties, and the headstock should be mounted on a swivelling base to enable it to be accurately positioned facing one or other of the twin creels, or centre-up when both creels are in use. A general view of one of these warping or beaming headstocks is shown at Fig. 1, and Fig. 2 shows part of the creel and the broken-end stop-motion at the apex of the creel. The double-post tensioning device for each end is shown at Fig. 3 and Fig. 4 illustrates a type of cone holder, both separated and assembled. Fig. 5 shows diagrammatically the general arrangement of twin creels and the swivelling headstock (Figs. 1 to 4 are reproduced with acknowledgements to Allen Warper Co., Lowell, Massachusetts).

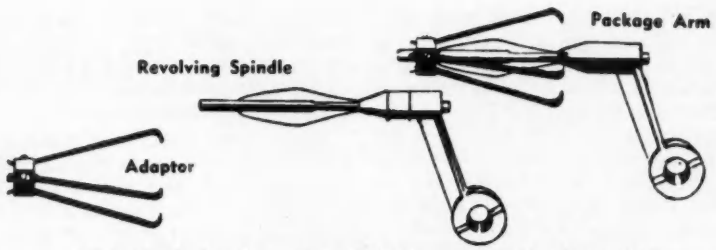


Fig. 4. Cone holder dismantled and (right) assembled (Allen Warper Co.)

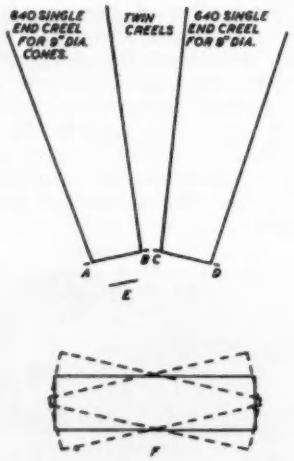


Fig. 5. Twin creels. A-B-C-D—electric stop motion at apex of creel. E—portable stand for quickly transferring re-creeled ends. F—swivelling headstock

Soviet Wool Plans

Russia has a seven-year plan to become a world wool producer, it was revealed in Sydney by Mr. P. Yesalov, who is leading a party of five Soviet scientists and wool technologists on a three weeks' Australian tour—a return visit for a recent Russian trip by Australian wool men. Mr. Yesalov said that by 1965 Russia would have at least 200,000,000 sheep, or double the present total and four times the sheep population at the end of the second world war. This would be 50,000,000 more than Australia's present sheep population. He admitted Russia could not rival the quality of Australian wool.

* * *

"Courtelle" to be Produced in France

"Courtelle," the acrylic fibre developed in the U.K. by Courtaulds Ltd., is to be manufactured near Calais in a new plant being built adjacent to the rayon factory of Courtaulds' subsidiary Les Filés de Calais. Production is expected to begin early in 1961. The plant will be operated by Courtaulds France S.A., a new Courtaulds subsidiary in which the Prouvost Group of Roubaix (worsted combers and spinners) is also participating.

* * *

U.K. Buys More Wool

U.K. imports of wool during nine months of 1959 totalled 571·1 million lbs. (actual weight), or 25% more than the 454·7 million lbs. imported in the corresponding period of last year, according to B.o.T. figures. Largest supplier was Australia, with 239·2 million lbs. (actual), compared with 189·3 million lbs. in nine months of last year, an increase of 26% and representing 40% of Britain's overseas purchases of wool.

New Zealand wool shipments increased from 131·4 million lbs. in the first three quarters of 1958 to 140·8 million lbs. in the similar period of this year, an advance of 7%. South African wool shipments increased over the same periods from 33·5 to 44·5 million lbs., an advance of 28%. These three Commonwealth countries furnished more than 70% of total U.K. imports of wool over the first nine months of 1959.

Cotton, Rayon and Mixture Fabrics

Reproduced approximately half-size, linear, the eight cloths on the facing page are a representative selection from the ranges manufactured by A. S. Orr and Co. Ltd., Empire House, 10 Charlotte Street, Manchester 1. Brief details of these attractive cloths are as follows:—

(1) Design D199. In a small, neat "basket-weave" type of dobby design, this 38 ins. wide cloth is in a light crimson shade of soft lustre.

(2) Design D325. Light green and fawn yarns with a variegated green knop endow this viscose/acetate brushed afghalaine with an attractive double-toned effect (37½ ins. wide).

(3) Design D184. A very distinctive spun rayon dobby design in a bright red/pink shade in which the figuring effect shimmers attractively as the light falls on it.

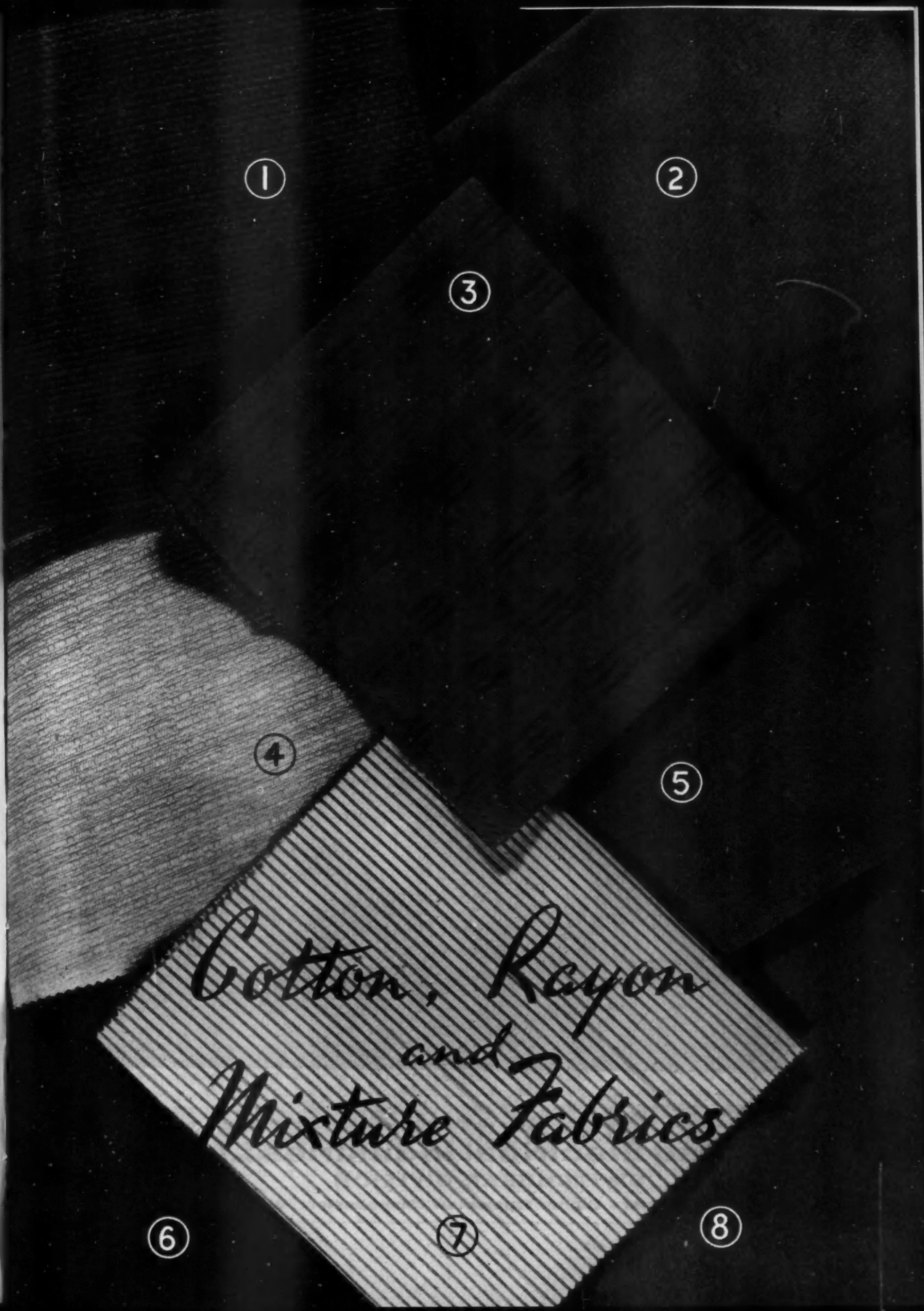
(4) Design D142. Lime green and cream yarns (green warp and cream weft) result in this variable effective dobby design. This 37½ ins. cloth is a viscose/acetate mixture.

(5) An "Acrilan"/viscose dobby design in a sky-blue shade. Weave and yarn mixture give a crisp, firm handle with a subdued lustre (37½ ins. wide).

(6) A finely set plain spun rayon sail cloth in a royal blue shade (37½ ins. wide).

(7) Black and bright yellow warp with bright yellow weft are used to produce this striped spun rayon Bedford cord (38 ins. wide).

(8) Another beautifully woven and finished cotton sail cloth in a striking scarlet shade (37½ ins. wide).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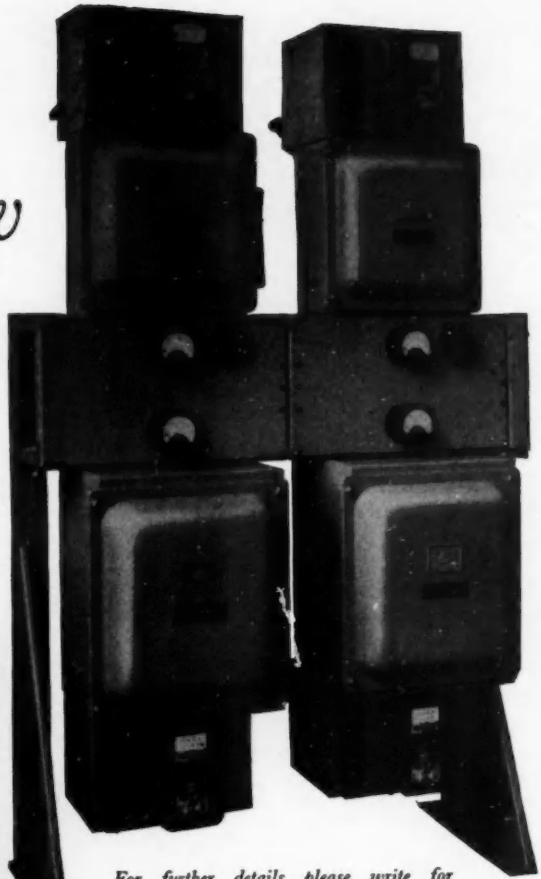

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Factors for Reducing the Waste Percentage

Most of the waste losses occur during hackling and carding and the variable nature of the raw material always demands accurate judgment to determine the extent of processing

By S. A. G. CALDWELL, F.T.I.

EMPHASIS on re-equipment and redeployment in recent years as means for bridging the gap between the selling price of linen and its competitors has diverted attention from other factors no less important, and which can be made effective with little capital outlay or disruption of the labour force, assuming the plant to be maintained in efficient working order and operative loading to be appropriate to the labour involved.

Relation of material losses to processing requirements of the fibre being spun is undoubtedly the most important of these in view of the relatively high percentage of the yarn cost—40 to 60% according to count and quality—represented by material, and the bearing of the degree of dressing, hackling, carding and combing on spinning performance and rate of production.

While a knowledge of material losses during manufacture is essential for costing purposes the data available often has little relation to the performance of the material in work consequent on the variable nature of the fibre processed and the absence of a proper system for checking waste losses. Accurate details of machine speeds, settings, etc., must be recorded with waste losses for all tests made at each stage of manufacture as a guide in assessing probable future requirements.

The schedule of tests must cover the whole range of manufacturing operations, with a separate test for each one. It is not sufficient to know that a certain loss has been incurred in converting a stated quantity of raw material into yarn. To ensure economic production and, if possible, to improve on past performance, it is necessary to know the amount incurred at each stage of manufacture. The frequency of testing will depend on the variation in fibre quality. Even with standard grades of uniform quality on continuous runs a regular system of once monthly testing should be carried out at all stages of manufacture.

The variable nature of the raw material calls for accurate judgment of, and a wide experience in assessing fibre requirements for hackling and carding, in which operations the major losses are incurred. The extent of these define performance and production rate at all subsequent stages to the finished yarn, as well as the quality and strength of the latter. While certain machines and cards, by reason of their tool and roller capacity, may be reserved for specific types and grades of fibre, refinements in setting and speeding will usually be necessary

Fig. 1. Mounted in brass-covered stocks these staples are pitched 1 in. apart

to ensure best results from individual parcels or lots.

Machine Function

The function of the hackling machine is to parallelise the fibre strands, reduce their cross sectional area, remove short and matted fibre, stick, etc., with minimum loss of good material. The determining factors are suitability of pinning, machine speeds and settings. While the requirements of different types and grades of flax vary considerably, and are usually recognised by reserving specific machines appropriately tooled and pinned for these, the quality variations common in each grade frequently call for changes in sheet speeds and settings for individual parcels to ensure efficient hackling and maximum yield. The person—whether flax manager or machine master—responsible for running the hackling department must therefore be widely experienced in the processing requirements of all types and grades of fibre normally worked, and must also be on the spot to examine the fibre on the machines and to order any changes in speeds and/or setting considered necessary.

The extension of machine scutching and improvement in handling has largely dispensed with the need for roughing as a preliminary to hackling. When processing slightly tossed over retted, or weft fibre undue loss will be prevented by substituting staples for pins in the first round of tools on both root and top end machines. These are shaped as indicated in Fig. 1 and are pitched about 1 in. apart, being mounted in brass covered stocks.

Improvements in machine design, including the variable speed sheet drive and the cam-operated head lift, both intended to effect a more uniform rate of hackling and so reduce the strain on the fibre during this process, have not been adopted to an extent justified by the economies made possible, and which would quickly repay the cost. The difficulty of obtaining sufficient supplies of high grade fibre, and the considerable difference in cost between dressed flax and tow in this material points the need for introduction of one or other of these mechanisms on machines reserved for hackling high quality fibre.

Other factors which have an important bearing on fibre yield include the method of laying the flax on the holders to determine the length hackled root way and top way; the gripping power of the holder plates and the setting of the draw through mechanism. The root end of the flax is usually machined first and the top

Fig. 2. Method of laying the flax on the holders

end last, the pieces being placed in the holder so that when the plates are screwed down both ends will lie level if the root end is doubled back over the holder as shown in Fig. 2. This does not mean that the length hackled each way will be equal. The deepest point of pin penetration is about 2 ins. from the edge of the holder when the head is at its lowest point of travel. In the event approximately 40 to 45% of the piece will be hackled root way and, following the change over at the back of the machine, 55 to 60% will be hackled towards the top. On flax of 30 ins. overall length, and allowing 2 ins. overlap at the draw through, the length hackled root way will be

$$15 = 2 = 13 = 43\%$$

and top way

$$15 + 2 = 17 = 57\%$$

Study of the disposition of the fibre system in the plant stem, and measurement of the bulking and lie of the fibre strands in the scutched material suggest that the yield in hackling could be improved by increasing the length hackled top way. This, however, is defined by limitations of machine design—holder width, height of head lift possible, etc.—as well as by the overall length of the fibre.

The ability of the holder to prevent the fibre being drawn away by the pull of the hackle sheets is determined in greater measure by the degree of uniformity attained in spreading the flax on the bottom plates and the gripping power of the holders, rather than on the extent to which they are tightened by the automatic wrench. While the time allowed for spreading is limited by the rate of head lift, uniformity in piecing out can assist in this connection.

The gripping power of the plates is determined by the camber and the form of interlining used. Plates gradually lose their camber when in use so that a frequent check up should be made and any considered defective removed for re-cambering. The most effective and economical lining is undoubtedly heavy crepe rubber held in position on the bottom plate by the centre screw and holder toes, being riveted to the top plate at intervals along the edges.

Card Clothing and Settings

Opinion is still divided on the relative merits of wood and leather foundations for card clothing, both types giving good results in certain conditions. Wood clothing generally is keener than leather. It permits closer setting of rollers in relation to each other and to the cylinder so that the degree of carding required is obtained with minimum strain on the fibre, and with less work than would be necessary on units with leather clothing. The special merit of the latter lies with the knee bent pin or staple, which has better holding power, particularly when working short open tow grades and man-made fibre staples.

Various mechanical devices are available for fitting to cards to help in reducing material losses. Due to their limited selectivity, however, their useful application is confined to cards working open and relatively clean material, such as root tows and man-made fibre staples which are free from nep. The fibre recuperator shown in Fig. 3 is undoubtedly the most selective. It consists essentially of a reciprocating grid in which light flexible steel strips are mounted on edge and at right angles to the axis, the pitch, or spacing being defined by the grade of material which the card is intended to work.

The fibre, etc., thrown off by the first three or four strippers, is directed on to the grid A by the metal shields B, and works its way gradually towards the centre, due to the concave shape and reciprocating action of the grid. Shive, dust, neps, etc., are shaken out in the process and fall between the strips to the pit below. The long fibre retained is picked up by the lower of two pinned rollers C and D, which convey it back to the cylinder for recarding.

In the manufacture of blended tow yarns the stage at which blending is effected has an important bearing on the conversion loss as well as on the quality of product. When the ingredients differ considerably in carding requirements separate carding is usually desirable, except when a small percentage of a long staple tow may be blended with short staple material to improve the web forming capabilities on the card rollers. In certain circumstances also it may be desirable to blend a top end tow with root end fibre prior to carding to ensure uniform distribution in the rove and to improve the spinning properties and uniformity of the yarn.

Carding is effected most economically and waste losses reduced to a minimum by suiting the density of pinning, the speed and setting of the rollers in relation to their opposite members and to the cylinder to the requirements of the material. As the density of pinning cannot be readily altered it is usual to reserve individual cards for work appropriate to their specifications, the different amount of carding required to produce satisfactory results from the different qualities of material processed being effected by changes in speeds and settings.

Variations in Quality

The practice followed in some mills of running cards on standard settings considered appropriate for the class of material each unit is intended to work, without regard to the individual peculiarities and requirements of each batch or blend frequently results in indifferent carding as well as unduly high waste losses. However carefully the material may be selected and blended in the tow store variations in quality and fibre condition may call for corresponding changes in speeds and/or settings of the card members, and it is the duty of the carding master to make frequent examination of the material in each batch in work, as well as the card sliver to ensure that the degree of carding is just sufficient to attain the desired result.

A regular system of proofing should be established to check up on material losses. This being done at least fortnightly, or more frequently if variations in the raw material make it desirable. A set weight—usually 100 lbs. of each batch or blend—is run through and the carded sliver

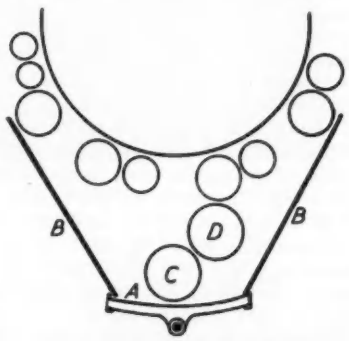


Fig. 3. The fibre recuperator

weighed to calculate the loss incurred. The results are recorded in the "proof test book" for comparison and future reference.

If the hackling and carding operations have been appropriate for the fibre requirements losses during subsequent drawing and roving should be comparatively small. A certain amount of inter-fibre binding substances, cortical tissue, etc., will be removed by the splitting action of the gill pins in the draft field. Some fibre is picked up by the roller surfaces and accumulated in the gills. These losses vary with the quality of the material in work and the condition of the drafting mechanism. Some classes of fibre, notably dew retted, some Dutch and Flemish water retted, contain a high percentage of waxy substances which cause the fibre to "lick up" to a greater extent on the roller surfaces, necessitating frequent washing and cleaning of roller pads and scrapers. With the usual practice of breaking out the slivers for the first few feet run through following these operations for prime yarn numbers considerable wastage may result.

Maintenance of drawing and pressing roller surfaces in good condition and the application of minimum pressure necessary to ensure uniform drafting will reduce the need for roller cleaning and washing, as will also the proper upkeep of roller pads and scrapers. The greatest losses incurred on drawing and roving frames result from the need to break away light slivers in front due to ends running out or breaking at the back of the frame. This is traceable to one or other of the following causes—incorrect speeding to ensure an adequate supply of material to succeeding frames, badly packed cans which result in sliver breakage on withdrawal and inattention on the part of the machine attendant. While automatic can tramping motions are now widely installed and eliminate the trouble with regard to can packing, there are still many card heads and drawing frames in operation without these. Where this is the case it is particularly desirable to relate the can diameter to the grist of sliver delivered into it.

As with carding a regular system of proofing should be established covering all grades and counts in work, the data so obtained being recorded for use in quantity and cost calculations. This may be based on a definite weight of line fibre to be spread, or of card sliver in the case of tow. The weight of rove made from each test is ascertained and the weight loss calculated as follows:—

Total weight of flax to be spread .. .. .. **200 lbs.**
Net total weight of rove .. **188 „**

$$\text{Percentage loss } \frac{100 \times 12}{200} = 6\%$$

Weight losses incurred in drawing and roving usually lie in the range 3 to 6% for wet spun yarn numbers, rising to 10% for certain low grade dry spun tow counts.

The length of reach, defined by the distance between the nips of retaining and drawing rollers, and the means employed to facilitate and control the movement of the fibre in the draf field to ensure levelness of the spun yarn to a large extent determine end breakage, and consequently, material loss in spinning. Removal of soluble substances from the material during maceration in wet spinning is also responsible for a considerable weight loss which varies with the class and quality of the fibre being spun, being highest in dew retted and low grade dam retted material.

End Breakage Factors

For each count and grade of yarn there is a certain reach which will combine maximum uniformity in drafting with minimum end breakage. The factors determining this include quality and strength of fibre; method of fibre extraction from the straw; weight of and twist in rove; spinning draft; condition and temperature of water in the trough; condition of and pressure on retaining and drafting rollers. These are so numerous and the fibre quality factors so variable that no standards can be established. The appropriate reach for each frame is determined by performance and by yarn appearance.

With complete softening of the inter-fibre binding substances during the rove passage through the trough the reach could be maintained at a length just exceeding that of the fibre ultimates to ensure maximum control in drafting. This degree of maceration is not obtained in practice, and to ensure best drafting conditions the reach must be lengthened to an extent that will permit most uniform drafting. This will result when a steady pull is maintained on the rove in the draft field between the retaining and drawing rollers, with absence of any plucking which would denote fibre strand breakage. It is measured in practice by feeling the rove tension with a finger.

The rate of maceration increases with trough temperature and with the softness of the water. With each factor there is a limit which, if exceeded, will result in undue weight loss due to removal of an excessive amount of soluble matter and the production of a rough hairy yarn. Rove weight, spinning draft and rove twist also have an important bearing on the length of time required by the material in the trough. The time needed for wetting out varies inversely with the rove weight and amount of twist. The latter should be kept at the minimum necessary to prevent drafting or end breakage between the rove bobbin and retaining rollers. Heavy rove spun on long drafts spends more time in the trough and has, consequently, a better opportunity to become effectively macerated than would light rove spinning on short drafts. The rate and extent of wetting out are determining factors of yarn uniformity, rate of production and spinning performance, and are consequently closely related to the weight loss. In practice best results are usually obtained by keeping the reach as short as possible increasing the rove weight and spinning draft if necessary to ensure this.

End breakage in wet spinning is normally responsible for a higher percentage of weight loss than results from other factors. This trouble is closely related to the mechanical condition of the frame, including the extent and distribution of pressure on the retaining and drawing rollers. The form and pitch of flute on the latter should be related to the bulk of fibre in the nip to ensure a powerful "bite" and effective fibre control in drafting.

The hard nature of flax fibre causes rapid wear on all machine parts with which it is in constant contact. This is accentuated on the spinning frame by the twist in rove and yarn, which increases its wearing and cutting action on roller surfaces, thread plate and flyer eyes, travellers, etc. This requires frequent examination of all parts subject to excessive abrasion, and a regular programme for repair and renewal of these.

The weight loss in spinning is calculated on the difference between the weight of a check test of rove—say approximately 200 lbs.—and that of the dried yarn produced from it. This will necessarily include winding and drying operations, so that allowance must be made for these to arrive at the spinning loss. The first mentioned are usually in the region of 1%, while the loss in spinning varies from about 5% for prime warp and fine weft counts to as much as 15% for low grade weft tow yarns.

Mixture Fabrics: Cotton/Wool and Cotton/Silk

Descriptions, yarns, weave, ends and picks of cotton/wool and other mixture fabrics, including alpacas, crepes, cords, haircloth, taffetas, poplin types and many others

By W. MIDDLEBROOK

WHEN different yarns are combined to make a fabric, the product may be known as a *union cloth* or a *mixture fabric*. The commonest mixtures of this kind are cotton/wool, silk/wool, and silk/cotton, with cotton/silk close behind, and wool/silk and wool/cotton by no means so common. Sometimes the union is made to cheapen a fabric, so that many imitations of pure wool fabrics are made with a cotton warp and wool weft; this is not the case with a silk and wool combination, when silk is used in warp form, very often a most expensive and exclusive cloth resulting from the union of these two costly animal yarns. A cotton/wool mixture can be made on a cotton loom, the warp being of that material, and the only alteration necessary is the change to larger shuttles to carry the wool weft; it is more difficult to try to weave a different type of warp fibre than that for which the loom was designed, though in some cases a cotton loom can be slowed down and fitted with different picking noses to carry a wool warp. Some looms, such as the Yorkshire circular box loom, can be used to weave cotton, wool or silk, with suitable modifications.

Besides the combination of warp and weft of different fibres, there is also the union fabric made with mixture yarns, a practice that is generally carried out to cheapen the fabric; *union greys*, for example, are shirting fabrics made from a cotton warp and a cotton/wool mixture yarn weft, one quality being 56×44, 20s/7s, and there are *union shirtings* for shirts and pyjamas with a mixture weft and a cotton warp, 38×40, 16s warp and weft.

Union cloth is a name given to such fabrics as *alpacas*, *cashmeres* and *italians*, mostly used as lining fabrics. *Alpaca linings*, usually twill weaves with cotton warp and alpaca weft, include such fabrics as *orleans linings*, and *hilda linings*, 68×64, 20s/40s; *irene twills*, 88×72, 2/80s warp and 30s weft. *Alexandra twills*, 80×72, 36s black cotton warp and 24s alpaca weft. *Mabel twills*, 82×70, 2/60s warp and 26s weft with a 1×5 twill weave. *Princess twill linings*, with an eight-shaft weave as shown at Fig. 48; and *Puritan*, plain or fancy twill linings 56×70 with 2/90s cotton warp and 30s alpaca weft. Other alpaca mixture fabrics include *corded alpaca*, with cords down the piece. *Florentine*, a dress fabric with a 9-shaft weave, 70×56, 2/50s super cotton warp and 16s alpaca weft, and *grenada*, dress material with a black cotton warp and alpaca, mohair or lustre weft with a 5-end twill weave as shown at Fig. 49, one quality being 76×52, 2/40s warp and 12s weft. Another name for these *alpaca mixtures*, English fabrics that date from the early nineteenth century, is *lustre cloths*, also known as *brilliantines*, *glacés*, and *sicilians*. One of the first alpaca mixture fabrics successfully made in England was

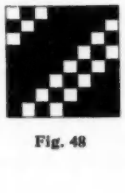


Fig. 48

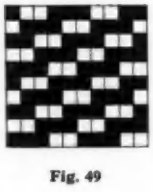


Fig. 49

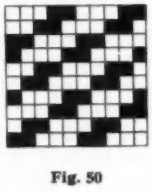


Fig. 50

alpaca orleans, made in 1839 by Sir Titus Salt, who invented machinery for the successful spinning of alpaca wool in 1836.

Where *alpaca*, hair of the Peruvian llama goat, is noted for its soft handle and is eminently suitable for dress materials, *mohair*, from the angora goat, is noted for its brilliant lustre, being made into yarns for *plushes*, *velvets*, *sicilians*, *lustres* and *linings*. Cotton/mohair mixture fabrics include *lustre linings*, with a 4×1 twill weave, one example being 82×72, 44s black cotton warp and 28s mohair weft. *Glacé* is a lustre fabric of fine cotton warp and thicker mohair weft, the warp being heavily weighted. *Angora cloth* is a plain weave fabric. *Palm beach cloth* is sometimes made with a two-fold cotton warp and a lustre weft of mohair, and *pony skin*, an imitation Russian pony skin fur with black two-fold super cotton warp and mohair pile weft. *Mohair brilliante* is a lustre dress fabric, again with a two-fold cotton warp. *Mosambique* is a French striped or checked material of cotton/mohair, another dress fabric, while *mozambique* is a light-weight gauze fabric of the same materials.

Dress fabrics of cotton and wool include *crepe rachel*, with hard cotton warp and coloured worsted weft; *farmer's satin*, a good quality fabric that, when given a lustre finish, is also used for linings. *Alaska* is a 2×2 twill dress fabric in which both warp and weft are a mixture of cotton and worsted. *Jupon* is another cheap dress fabric of cotton/wool that was originally made of silk/worsted. *Alexandria* is a dress fabric woven in small designs, has cotton warp and wool weft. *Ancelia* has a cotton warp and mixed wool weft, cross dyeing producing contrasts in the finished fabric. *Australian crepe* has worsted weft with the cotton warp, the final shrinking of the finished cloth producing the crimped or crepe effect. *Brilliantine*, as its name implies, is a dress fabric with cotton warp and lustre worsted weft, sometimes made with jacquard designs. Another dress fabric with 24s lustre worsted weft and 2/60s cotton warp is called *lorraine*, with a twill weave as shown at Fig. 50.

Metz cord is a fine dress fabric with a broken twill weave shown at Fig. 51, the picks doubling the warp threads to create a fine cord effect; one quality is 80×160,

using a cotton warp and 56s botany weft, but better qualities use all worsted yarns. *Momie cloth* resembles crepe, a plain weave dress fabric of cotton/wool that was once made wholly of silk; another version of this fabric is *mummy cloth*, a lustre-less fabric of solid black with a crepe appearance that is used for mourning. The original *mummy cloth* was made by the Egyptians thousands of years ago for wrapping the corpses of their dead; made wholly of linen, one example of this ancient cloth was 140×64, with 100s linen warp and weft, but one wrapping was found to have over 500 ends per inch.

Orleans cloth is so-called because it was first made in 1856 by a British manufacturer called Barratt for an American customer. With a fine Egyptian cotton warp and botany weft, Barratt produced a close-woven "summer cloth" for dress material, with such variations as plain weave, twill weave and crepe. A dress fabric that takes its name from the source of the wool, a town in New South Wales, is *paramatta*, once of silk and worsted but now a 2×1 twill weave of cotton and wool. The Bradford type *tennis cloth*, a dress and shirting fabric once wholly of wool, has a cotton warp and wool weft with a 2×2 twill weave.

Other shirting fabrics include *angola*, a plain or twill fabric with cotton warp and angola—a shoddy mixture of wool and cotton—weft. *Ceylons* comprise cotton warp and wool mixture weft, in plain colours or stripes for shirts and underclothing, and *llama shirtings* are super quality shirtings and blouses where both warp and weft are a union of wool and cotton, the name *llama* referring, like *angola*, to the mixture yarns. *Mayo dress fabrics* are sometimes made with super double cotton warp and botany weft, using a mayo twill as previously shown at Fig. 38.

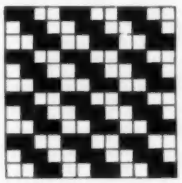
Gordon cord is a twilled fabric of the whipcord type, one quality being 80×120, 2/60s cotton warp and 2/36s worsted weft. *Persian cord* is of cotton and botany, 72×112, 2/60s cotton warp and 60s wool weft, with certain warp ends working in pairs to form cords on a plain-weave fabric. *Russel cord* is a cotton/worsted fabric giving a rib effect with the warp lifting two ends as one, a simple matting weave making a cloth that is used for summer coatings and for scholastic gowns. Other mixture fabrics used for clothing include *jeannet*, a strong and coarse fabric of cotton/wool and a twill weave used for winter work clothes. *Camelot* is a coarse fustian for work clothes, though the same name is used to describe an imitation *camlet* made of cotton warp and wool weft. *Cassinet* is a cheap trouser and waistcoat cloth with coloured stripes in a cotton warp and wool weft.

Heavy mixture fabrics include *downs*, with a 4-shaft twill weave, 36 ends per inch of 2/18s cotton and 28 picks of thick woollen weft. *Hair cloth* is another heavy twilled fabric, with a waste wool warp and calf hair weft, made into carriage rugs. *Maude plaid* is a 36×64, 2/10s cotton warp and heavy wool weft. *Poncho cloth* is a cross-dyed, heavy cotton/wool fabric in the style of a *melton*. A true *melton* is an overcoat cloth with a 2×2 twill weave, raised, cropped and heavily milled in the finishing process, and wholly of wool or with cotton warp and wool weft. Other overcoat mixture fabrics are *beaver*, a napped fabric that may be made with a cotton warp and shoddy wool weft, besides being wholly of fine grade wool. *Mackinaw coating* is a twill overcoating in the double-cloth style, each side a different colour, with a cotton or cotton/wool warp and wool weft. *Fawn canton* is a twilled cotton/worsted fabric, proofed for raincoatings.

Coffin cloth, not to be confused with *mummy cloth*, is used for shrouds and for coffin linings, sometimes all cotton but originally cotton/wool. *Italian cloth* is of cotton and botany, the cotton warp being dyed black and the piece cross-dyed. It is a weft-face sateen, heavily picked, with a smooth surface and a brilliant and lasting lustre after finishing. Lustre worsted weft is used with a cotton warp and a fancy twill weave to make *emperor lining*, 80×80, 40s/30s. *Crepe moirette* is a furnishing fabric of hard spun cotton with coarse wool weft. Another furnishing material of cotton and wool is *banbury plush*, a heavy pile fabric. *Kerseynette* is a plain cloth, 72×52, 2/40s cotton warp and 30s worsted weft. A gauze fabric sometimes made of cotton and wool is called *étamines*, the French name for bunting or sifting cloth, one example of this voile-type material being 88×38, 30s/24s; another light-weight cotton/wool mixture cloth is *molaine*, an imitation *delaine* or "wool muslin." *Pekin stripes* are sometimes made with cotton warp and worsted weft, also *pyjama stripes*. The original *winsey*, now a plain weave cotton flannelette, was of cotton and wool.

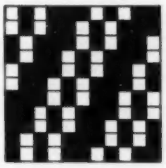
Wool/Cotton Mixtures

Mina cloth is a heavy 2×2 twill clothing fabric of wool/cotton. A cheaper form of *cassimere*, which is an all-wool 2×2 twill fabric with a smooth face, is made with worsted warp and cotton weft. *Cassinette* is a waistcoat fabric, sometimes ornamented with small spots or figures on a fine twill ground, that may be made with wool warp and cotton weft. Also *gaberdine* may be made with worsted warp and cotton weft, with an eleven shaft weave as shown at Fig. 52 to give a whipcord effect. A tropical suiting of wool and cotton in a plain weave is called *florodor cloth*, while *everlasting cloth*, used for gaiters and shoe tops, may be of wool/cotton as well as all wool, with a fine warp-satin weave.



(left) Fig. 51

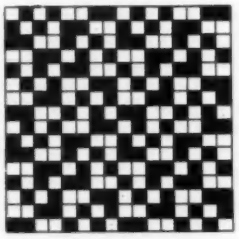
(right) Fig. 52



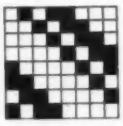
Cotton and Silk

Silk and cotton mixture fabrics are usually a cheaper version of the pure silk product, so that names of French derivation are common to both. *Taffetas*, for example, are given a French flavour by their descriptions, *taffetas alpaca* being a plain taffeta with silk warp and cotton weft, *taffetas armure* a silk/cotton brocade on a plain taffeta ground with a warp-satin figure, and *crepe marocain* a silk/cotton or silk/wool fabric with a taffeta effect, used for dresses and linings. *Taffeta lining* is a high quality lining for ladies' dresses, 200×80, with a fine silk warp and 2/60s cotton weft. *Taffetine* is a cheaper material for coat and dress linings, the silk warp being shot with either cotton or linen. A good quality dress fabric of silk and cotton with alternate stripes of satin and cord on a taffeta ground is called *boyau*, a French term that refers, among other things, to cords of catgut.

Moiré means the watered or wavy effect that appears naturally on certain silk fabrics when the light falls on them at an angle, an effect that can also be obtained by the use of specially-engraved pressure rollers. *Moiré nacré* imitates the pink tints seen on the inside of sea-shells; *moiré ocean* has a wave design on moiré fabric. *Moiré à pois*, or "moire of the peas," is embellished with small spots or "peas"



(left) Fig. 53



(above) Fig. 54

in satin order. *Moiré à retours* has a watered effect in which each half of the cloth has the same pattern but in reverse; *Moiré rondie* or *moiré francaise* has watered designs like the rings on tree trunks. Fabrics of this type, made with cotton weft and silk warp include *moiré velours*, a cheap fabric with a loose weave, used for hangings. *Moiré renaissance* is a coarse-ribbed cloth that is folded, calendered and pressed to produce striped watered patterns, and *serge moiré*, made with a spun silk warp and glazed cotton weft, with a *moiré* or watered finish.

Ferrandine, a plain dress fabric of silk warp and cotton or worsted weft, was introduced by a Frenchman called Ferrand. *Lamé cloth* is a brocade on a satin ground, used for dance frocks and matching shoes, also for furnishings, with a tinsel warp and cotton, silk or rayon weft. Another figured fabric that may be wholly of silk or silk/cotton is *brocatine*, a brocaded material. Other dress fabrics include *mull*, *Norwich crepe*, *satin gaupré* and *royal twill*. *India mull* is a fine bleached cotton fabric, 82×60, 70s/90s, but *China mull* has a silk warp and cotton weft. *Norwich crepe* is similar to *georgette*, of fine silk and cotton with a crepe weave as shown at Fig. 53. *Royal twill* is a fine silk dress material, the design of which is shown at Fig. 54, or it may be a union of silk and cotton, one example being 200×100, 75 den. silk warp and 2/20s cotton weft. *Moscovite* is a dress fabric, ribbed, of organzine and cotton and *satin gaupré* a silk/cotton dress material with embossed designs on a five or eight-shaft satin weave.

Several furnishing fabrics are silk and cotton mixtures. *Taborette* is a curtaining fabric with heavily-crammed stripes of warp satin and weft rib, 180×72, 75 den. silk warp and 2/100s super Egyptian cotton weft. *Faille* is French term for a silk head-dress fabric, but *faille cotton* is a furnishing fabric with gummed silk warp and doubled cotton weft with more ends than picks, producing a repp material, and *faille reversé* has silk warp and cotton weft to produce a curtaining fabric with a poplin face and a twill back. *Drugget* is a coarse fabric used as protection for carpets, of linen and wool, or jute and cotton, but *droguet*, the French for drugget, is a brocaded furnishing fabric figured with coloured schappe silk, organzine warp and cotton or rayon weft.

Peau de singe, or "monkey skin," is a satin-backed pile fabric of schappe silk and cotton weft. *Natte*, which means "matting or plaited," is a basket weave fabric of dyed yarns with a loose braided effect, of silk and mercerised cotton. *Gloria cloth*, with a 3×1 twill weave, is termed *gloria silk* when a silk warp and cotton or worsted weft is used and is used as umbrella fabric. *Bengaline* is a silk fabric of the poplin type with cords across the piece of cotton or wool; if wholly of silk, the fabric is called *bengaline de soie*. *Helvitia*, which means "Swiss," is another poplin type fabric that may be grège/schappe, a pure silk fabric, or with fine cotton weft, the ends doubling the picks. *Epinglé* is a ribbed fabric with large and small ribs alternating, of silk, or with cotton or worsted weft. Other ribbed fabrics include *Boyaux reppes*, a heavy-figured repp with Bedford Cords, a silk warp and doubled cotton weft. *Royale* is an eight-shaft weave with the rib line broken at intervals, silk/cotton, and *satin oriental*, an eight or twelve-shaft satin with silk warp and a thick, hard-spun cotton weft that makes the rib, one example being 220×42, 35 den. warp and 12s weft. *Satin double face* has two warps and one weft to imitate a double satin weave, with organzine warp and cotton weft.

Cotton/Silk Mixtures

The silk dress fabric *albert crepe* is sometimes made with crepe yarns of cotton and silk, a plain-weave fabric. Other plain mixtures are *bandanna*. *Chambray* is a light-weight cotton or linen dress fabric that may have silk weft, used also for aprons and overalls; and *China mull*, of cotton warp and silk or rayon weft, 82×60, 90s/50 den. *Coburg*, a cashmere that was introduced after Queen Victoria's marriage to Prince Albert of Saxe-Coburg, has been made in various mixtures, including cotton/silk and worsted-silk. *Croisé silks* are 3-end twills used for linings, wholly of silk, or cotton warp and silk or rayon weft. *Gloriosa* is another twill with cotton warp and silk weft, using the 3×1 *Gloria* twill, and *duvetine* or "mouse skin" is a 1×3 twill with a two-fold cotton warp and schappe silk weft, with a face that is cropped and brushed to look like doeskin, this fabric being dyed grey and brown for trimmings, collars and handbags.

Peau de pêche or "peach skin" is a cotton/silk pile fabric with a slightly rough face to emulate the bloom of a peach. *Moréas* has a glossy face, a cotton/silk fancy-striped satin. Another satin stripe is *roman stripes*, a cotton/silk weft satin with the silk in brilliant colours that make stripes across the fabric, and *dugrebia* is a fine cotton/silk that may be striped or checked. *Kerseynette* is a Bradford fabric that may be made with 2/40s cotton warp and silk weft. *Lampas* is a fine brocade of the satin damask type in which the warp and weft are of different colours; made up as shawls, the fabric may be of silk, cotton/silk or all cotton. A modified *lampas* called *lampasette* is made with a twill ground and brocaded weft figures, cotton warp and silk weft. *Lampas du Japan* is a brocade fabric for hangings and drapes, with satin figures on a repp ground, and is of silk and cotton.

High Ductile Iron Castings

Ashmore, Benson, Pease and Co., Stockton-on-Tees, have concluded a licence arrangement with Mond Nickel Co. Ltd., by which they are now in a position to supply S.G. or high ductile iron castings in accordance with B.S. 2789/1956. For twenty-five years Ashmores have offered high duty iron castings made by the Meehanite process for a wide range of applications and under the new arrangements will be able to extend their services by supplying grey iron, Meehanite iron and spheroidal graphite iron castings to the engineering industries in weights up to 25 tons in floor, loam, machine moulded and CO_2 moulded castings.

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Courtaulds' New Companies

Two new companies, Courtaulds North America Inc., located in New York, and Courtaulds North America Ltd., located in Montreal, have been formed with the object of exploring and developing opportunities for the expansion of Courtaulds' activities in U.S. and Canadian industries outside textiles. The new companies have been formed jointly by Courtaulds Ltd., Courtaulds (Canada) Ltd. and Courtaulds Incorporated. The chairman of both new companies is J. A. Woods, formerly president of Commercial Solvents Corporation, N.Y.C., and latterly a consultant to Courtaulds Inc. The president and chief executive officer of both companies is S. F. Wagdin, who was treasurer of Courtaulds Inc. from 1951 - October 1959.

• • •

Rayon Mills Sold

Courtaulds Ltd. have sold to William Tatton and Co. Ltd., yarn processors and dyers, Leek, the rayon processing mills of Harbens Ltd. These comprise part of Parkside Mills, Golborne, and the whole of Daisybank Mill, Culcheth, near Warrington. The transfer, effective January 1, 1960, is designed to ensure continuance of operations in the sections concerned.

Book Reviews

DIRECTORY OF OPPORTUNITIES FOR SCHOOL LEAVERS, 1959. Cornmarket Press Ltd., 1 Lower James Street, London, W.1 (price 8s. 6d.).

In the preface Lord Monckton comments on the wide range of opportunities confronting today's younger generation. He might also have added that never have so many good guides to careers been published as there are nowadays. The volume under review is very definitely one of the finest and most comprehensive ever published, both its reference pages and its editorial articles being well-designed for their purpose. Openings for employment and prospects offered to school-leavers by 134 industrial and commercial organisations and government departments throughout Great Britain are given in considerable detail in the reference section, which also includes a classified index of these organisations.

The editorial part of the book consists of a number of articles, written by experts, on where to get advice before deciding on a career, opportunities for girls in industry, the art of being interviewed, and the necessary qualifications for university entrance. The section on technical training and apprenticeship describes the vast resources of technical education at the student's disposal and a further section deals with prospects and careers in the different professions and lists the names and addresses of the official bodies concerned.

S.P.S.

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SKINNER'S HOSIERY AND KNITGOODS DIRECTORY, 1959. Thomas Skinner and Co. (Publishers) Ltd., 44 Brazennose Street, Manchester 2 (price 40s.).

The twelfth annual edition of this useful directory is similar in arrangement to its predecessors and its four divisions contain full information about the companies operating in this branch of textile production and distribution. Addresses, directors, principal executives and type of equipment installed are given for each company listed in the manufacturers' section, which also has lists of hosiery yarn spinners, dyers and finishers, wholesalers and distributors and export houses. These firms are also shown according to geographical location. Over 15,000 entries are given in the classified buyers' guide and some 2,500 trade names in the trade marks section. Hosiery machinery, chemicals, testing instruments and other requirements of the industry are classified under mill supplies and services.

* * *

PATENTS FOR ENGINEERS. L. H. A. CARR and J. C. WOOD. 1959. Chapman and Hall Ltd., 37 Essex Street, London, W.C.2 (price 18s.).

There has long been a need for an introductory course in patents and patent law with particular application to engineers both established and in training. This volume is based on the substance of lectures delivered by the authors at just such a course held at Manchester College of Science and Technology and, being the work of an electrical engineer and a lawyer, it helps bridge the serious technical gap between engineers and their advisers in patent matters by presenting in terms as far as possible free from legal terminology the basic outline of patent law and practice. In addition, there is brief comment on allied fields of industrial property protection, namely registered designs, copyright and trade marks. Chapter VII of the volume shows how fundamental developments in electrical engineering were protected by patents. The more important of these advances are the subject of short notes and extracts from the relevant specifications. A useful selection of the best books for further readings is given in a short bibliography and a table of patent office fees chargeable at the date of going to press. Cases cited are also listed with page references. The authors are to be complimented for their workmanlike yet imaginative explantion of a difficult subject.

S.P.S.

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BRITISH AND DOMINION TEXTILE INDUSTRY (excluding Lancashire and Yorkshire), 1959. John Worrall Ltd., Central Works, Oldham (price 30s.).

A long and consistently good record of service to the textile industry and its customers is maintained by this 69th edition of "Worrall's B. & D.," in which details are provided of firms operating principally in the hosiery, lace and kindred trades of the United Kingdom and the Irish Republic, together with the spinners, manufacturers and ancillary industries of the principal Commonwealth countries. In the case of United Kingdom firms, arrangement is both by location and trade classification and in that of the overseas countries by classification only. Additional sections give statistics of the textile industry, lists of trade, professional and educational organisations serving textiles and a guide to sources of supply of machinery, accessories and raw materials.

S.P.S.

* * *

HANDBOOK OF TEXTILE FIBRES. J. Gordon Cook, B.Sc., Ph.D., Merrow Publishing Co. Ltd., 276 Hempstead Road, Watford, Herts (price 15s.).

A clear and simple exposition of the essential facts about textile fibres is presented in this businesslike and reasonably-priced volume of over 400 pages. Dr. Cook has had long experience as a fibre research chemist, having worked on nylon and other polyamide fibres before taking up research work on polyester fibres including "Terylene." He also possesses a marked facility in the explanation of technicalities and interpretation of developments without needless repetition and to salt his remarks with a little dry humour. The arrangement of information on individual fibres is basically the same throughout, consisting of an introductory section describing the source of the fibre, its historical and economic background and the forms and sizes in which it is available. This is followed by a production and processing section, in which methods of production or manufacture are outlined together with notes on processing with special emphasis on dyeing techniques. The fibres' structure and properties are described under a uniform series of headings and cross-section and longitudinal microscopic views of the fibres are provided with additional stress-strain diagrams. Finally, there is an account of the fibre in use, delineating the behaviour of each fibre in practical use, with special reference to durability, laundering, crease-retention and resistance, ironing temperatures and suitability for various uses. The fibres are classified according to origin under the headings natural fibres and man-made fibres with suitable sub-divisions. In the case of man-made fibres known by trade names the names of the manufacturers are given.

S.P.S.

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NONWOVEN FABRICS — AN UNBIASED APPRAISAL. Nonwovens Associates, P.O. Box 328, Cambridge 39, Mass., U.S.A. (a group of recent graduates of Harvard Business School (price $15 per copy).

A comprehensive study of fabrics produced through bonding individual fibres together by chemical, mechanical, or thermal means, without the need for yarn interlacings. The report is designed to provide a complete, unified picture of the nonwoven fabrics industry of today, and to present an objective preview of the potential problems and opportunities for this field in the future. Included are chapters on: manufacture, finishing and dyeing, fibres, binders, applications, research and development, marketing, and implications for the future. In the appendices to the report are discussions of the patent and secrecy implications in the nonwovens field; as well as listings of patents and companies, a detailed bibliography, index, and glossary of technical terms.

* * *

NOTES FOR AUTHORS. Institute of Physics, 47 Belgrave Square, London. S.W.1 (price 3s. 6d.).

The Institute has published a 36-page booklet to assist less-experienced authors and to serve as a reference booklet for all who wish to contribute to the Institute's publications. It gives hints on the preparation of scripts and diagrams, on the layout of mathematics, the correction of proofs and so on. In addition to a bibliography of reference books and works on technical writing, the pamphlet also contains lists of the spellings, symbols and abbreviations.

* * *

"PROCION" DYESTUFFS IN TEXTILE PRINTING. I.C.I. Ltd. (Dyestuffs Division) have released an additional pattern card of "Procion" dyestuffs in textile printing (Ref. No. 9 : 05B). Eight patterns illustrate the use of selected members of this range for dyeing dischargeable ground shades on cotton.

* * *

POLYACRYLIC LATEX. — Information Sheet No. H.107 available, free of charge, from Information Department, British Geon Ltd., Devonshire House, Piccadilly, London, W.1, describes the properties of Hycar Latex 2601. The addition of this to urea or melamine resin blends is claimed to improve both tensile strength and abrasion resistance without detracting substantially from the crease resistance of the fabrics treated. The effect of changing pH value of Hycar/urea and Hycar/melamine resin blends is tabulated, and there are graphs relating wrinkle recovery tensile strength and abrasion resistance to per cent. pick-up.

TEXTILE MACHINERY and MILL EQUIPMENT NEWS

New Unit Wide Ram Coking Stoker

Continuous action of the self-cleaning fire bars automatically removes the ash to an ash-pit at the rear of the furnace

DESIGNED specifically to comply with all the provisions of the Clean Air Act, the new unit wide ram coking stoker announced by James Procter Ltd., Burnley, is stated to be suitable for all shell type and small water tube boilers. It is applied as a separate unit to each furnace flue with hydraulic infinitely variable speed control of grate and feeding mechanism. This arrangement enables the user to deal efficiently with variable boiler loads and also provides for maximum "turn down." The machine embodies all established features of the coking principles of combustion, that is, the release of volatile matter in the fuel takes place at the front of the grate and must pass over the incandescent coke bed covering the rest of the grate, all hydrocarbons being thoroughly consumed. The continuous action of the self-cleaning fire bars automatically removes the ash to an ashpit at the rear of the furnace from where it can be removed periodically without interfering with the operation of the stoker or disturbing the fire bed.

This new Procter unit is designed to burn a very wide range of fuels from rough slack up to doubles efficiently and without excessive smoke

Ram. This is the maximum width obtainable in a circular furnace flue, having patented features which have resulted in complete coverage of the grate. The ram, with variable stroke is driven by an eccentric fitted to the driving unit and results in a very positive action. A safety device protects the mechanism, and the fire bars can be isolated leaving the ram working, by means of a hand-operated dog clutch. The bottom plate of the ram box is made as a separate part and is easily renewed.

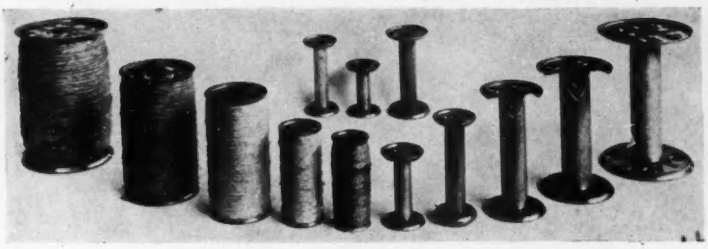
Fire Door. For lighting or emergency, hand firing is provided, giving access to the full width of the grate. The fire door can be opened without having to stop the stoker or disconnecting any mechanism. Carried on the fire door is the top coking plate, which is cast in renewable sections and designed with ample cooling surface. Replacement is extremely simple, the fire door is swung out and the plates dropped into position, this operation can be carried out with the Stoker running.

Bottom Coking Plate. Cast in either S.G. iron or Carbofrax material is arranged in renewable section and supported on a cast iron bearer carried from the stoker front plate. Everything possible has been done to provide a coking plate which will withstand burning and by careful choice of materials and by providing the casting with the maximum cooling surface this has been achieved.

Self-cleaning Fire Grate. Formed by plain longitudinal fire bars of the well-known Proctor design. The front of each bar is carried on a roller, thus reducing friction losses and the rear end is supported on a steam-cooled bridge. The bars are operated by chilled cams threaded on a hexigon shaft and are arranged to take the entire grate backwards at one movement and then return alternate sections, giving a powerful self-cleaning action. The clinkers are gradually worked off the rear of the grate into the ashpit. Cooling is supplemented by the circulation of a small amount of steam through the back bearer, which keeps the bar ends cool and is then exhausted through jet pipes arranged below the bars at maximum temperature areas and also to prevent the adhesion of clinker. The steam is not used for producing draught and the amount used is negligible.

Driving Unit. Applied to *each* machine comprises a ·75 h.p. totally enclosed fan-cooled standard motor with an output speed of 1,410 r.p.m. driving a Carter hydraulic infinitely variable speed gear, the output speed being variable between 1,410 and 50 r.p.m. Speed control is by small hand wheel. These units are robustly constructed and housed in a dust-proof fan-cooled casing. The output shaft of the gear is coupled by an enclosed Renold chain drive to a single reduction worm gear unit. The gear is enclosed in a strong cast iron casing, the output shaft carrying the ram eccentric and the outer half of a dog clutch. The gear is coupled through this clutch to the camshaft of the stoker.

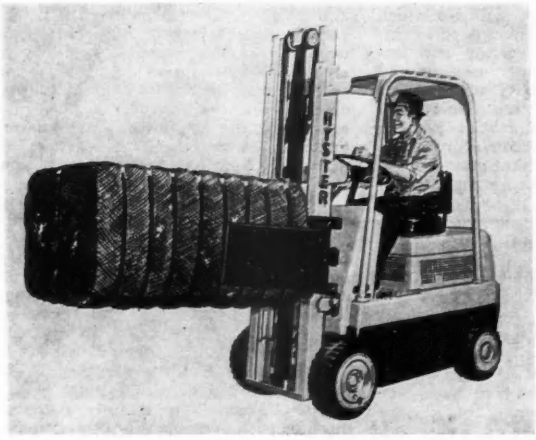
Composite Bobbins



AN interesting example of composite steel—light alloy construction—is provided by the patent "Stelkord" bobbins developed by Thomas C. Keay Ltd., Dundee, Scotland, to withstand the conditions of heavy wear encountered on hard fibre gill spinning frames, automatic spinners and spinning and twisting frames. The bobbin ends and centrally disposed strengthening tube are of steel, but the barrel itself is heat-treated aluminium alloy tubing selected for strength and durability, plus the ductility required to withstand the heavy compressive stresses imposed in winding certain types of synthetic fibres.

In the manufacture of the bobbins the aluminium alloy barrel acts as a spacer whilst the steel inner tube is screwed into the bobbin ends. A projecting steel tube is hydraulically folded back against the bobbin end to lock it into position at the correct traverse distance as decided by the length of the aluminium alloy barrel used. These bobbins, very strong in relation to their weight, will withstand very hard usage and are available in various spindle dimensions and traverses to suit customers' requirements. The special aluminium alloy tubing used in the "Stelkord" bobbin is supplied by Reynolds T.I. Aluminium Ltd., 10 Buckingham Place, London, S.W.1.

Special Cotton Handling Truck



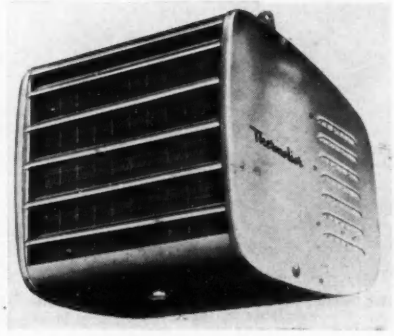
The Hyster 3,000 lbs. capacity lift truck

THE Hyster Co., 2902 N. E. Clackamas Street, Portland 8, Oregon, U.S.A., announce a 3,000 lbs. capacity cushion tyre lift truck (Space-Saver 30) specifically designed for handling cotton. The unit is equipped with a no-clog cooling system, special fuel system and engine breathing equipment and a special heavy-duty upright. The radiator truck is protected from clogging with lint and fluff by a removable pre-cleaner screen. Straight-line fins allow lint to pass through the radiator or to be easily blown out. In addition, lint pick-up from the floor is prevented by a belly pan running the length of the truck. An easily cleaned or changed dry-type air cleaner is located high under the hood to effectively filter out dirt and lint encountered on cotton handling operations.

Special equipment on the truck includes spark and flame arresting exhaust system, battery quick disconnect switch, shields for electrical connections, and protectoseal gas cap. The truck can be equipped with two-bale clamp, three-bale clamp cotton boom and a variety of other hydraulic attachments and options. The special heavy-duty upright construction is used to resist stresses due to side loading of bales. The design permits the use of all attachments for handling cotton bales to the side of the truck as well as in front.

New Unit Heater

FINISHED in silver grey stove-enamelled paint with hammer finish, a new Thermolier unit heater announced by Mather and Platt Ltd., Park Works, Manchester, is designed to fit into almost any background. The new range consists of five unit sizes which operate on steam or on low pressure or high pressure hot water. The different units cover a thermal output range of between 35,000 and 350,000 B.T.U./hour and almost any required output in this range is possible. A thermostat can be fitted into the motor circuit if required. The louvres are individually adjustable to control the direction of the warm air stream and stops are fitted to prevent any excessive movement that might restrict satisfactory air flow.



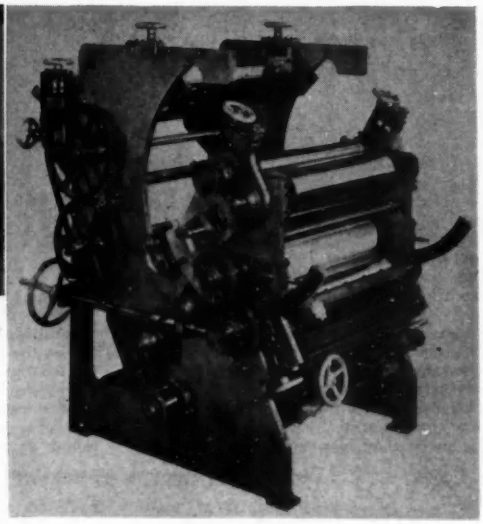
The unit is manufactured from steel sheet on which high purity zinc has been electrolytically deposited to give good resistance to corrosion. Close attention has been paid to quiet operation and anti-vibration mountings reduce noise to a minimum. The motor has been specially designed for fan duty and the fan designed to match the heat exchanger so that the quantity and velocity of air give the maximum thermal efficiency.

* * *

"Nylon H" Tubing

Wakefield-Dick Industrial Oils Ltd. now market and fit "Nylon H" tubing, when required, to their mechanical lubricating equipment. This flexible tubing can be rapidly installed in the most awkward and inaccessible positions, and will withstand up to 2,500 p.s.i. The tubing is available in five sizes, with outside diameters from ·125 ins. to ·375 ins., and inside from ·078 ins. to ·225 ins. respectively.

Fabric coating range including tensioner, reverse roll coater, triple zone oven, pull and tension rolls, and single unit type wind-up



Four-element combination coater, with elements for rotogravure, reverse roll, knife and solution coating

Plastic Coating Machinery

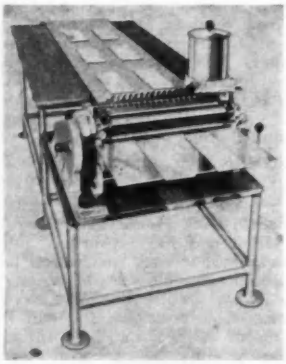
MATHER AND PLATT LTD., Park Works, Manchester 10, are now offering machinery for plastic coating a wide range of materials by continuous processes. Amongst the machines is the range developed by the C. A. Litzler Co. Inc., Cleveland, Ohio, with whom M. and P. have completed a manufacturing agreement.

The comprehensive range of this type of machinery consists of a considerable number of machines suitable for different requirements. They fall under the general headings of coating machines, both of the knife spreader and reverse roll types; impregnating machines; embossing machines; drying and gelling machines; fabric and plastic combining machines, and a complete range of the necessary materials handling equipment. In addition, pilot plants and laboratory equipment can be supplied.

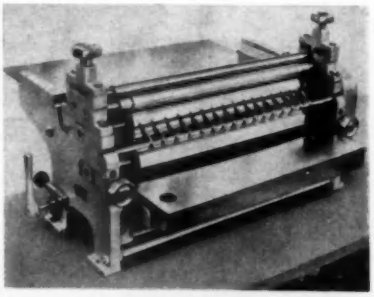
The two main types of plant for which considerable demand is anticipated in this country are for fabric coating and impregnating, and for paper coating and impregnating. The variety of materials that can be produced are too numerous to list in full, but coated fabrics now in production include mine conveyor belting coated on both sides, decorative fabrics, heavy coated vinyl fabrics for floor coverings, textile backed pressure sensitive tapes, rainwear fabrics, water and air impermeable fabrics, non-woven textiles, structural and engineering type fabrics and glass-coated fabrics for high temperature uses. Among the coated papers being produced are overlay, underlay and saturated papers, pressure sensitive tapes and adhesive coatings for decorative and other uses, including metallic foils, films, etc. A further interesting group of products is plastic coated strip steel and plywood. Considerable interest is being shown in these products in the U.S.A.

Label and Sheet Gumming Machines

LEON DAVIS & CO. LTD., 32 Holborn Viaduct, London, E.C.1, have extended their range of label gumming machines by the introduction to the British market of the "Zephyr" series of whole surface glueing machines and the "Tempo" universal glueing machine with built-in conveyor belt. The "Zephyr" series consist of three models. No. 1 can be supplied either for hand operation or with built-in electric motor drive. The working widths are 8, 12, 16 and 20 ins.



The "Tempo" universal glueing machine complete with built-in conveyor belt



The "Zephyr" whole surface glueing machine available in three models

No. 2 is supplied with built-in electric motor drive only. Facilities are also available for its use with hot glue by means of gas or electric heating. No. 3 is heavier built than No. 2 but has all the same features being suitable for use with either hot or cold glue and is available with built-in electric motor drive only.

The "Tempo" is a fully automatic machine with permanent built-in conveyor belt and is suitable for larger work than can normally be handled by the hand labelling methods. The "A" model is supplied with working widths of 200 mm., 300 mm., 400 mm., 500 mm. and 550 mm., and has built-in electric motor drive. The labels or sheets are automatically taken from the glue roller and are carried, with the glue side upwards, along the conveyor belt, being taken off for application, by operators sitting each side of the belt. The "B" model has working widths of 600 mm., 700 mm., 800 mm., 900 mm. and 1,000 mm., and is particularly suitable for glueing cartons and other stiff materials up to 3 mm. thickness.

* * *

New Anti-Snag Agent for Hose

Calatac ASK (I.C.I. Dyestuffs Division) is a finishing agent for the anti-snag treatment of nylon hose. It consists of a positively charged aqueous dispersion of methyl methacrylate polymer, without any plasticiser, has a slight delustring effect, and gives the hose a somewhat firmer handle.

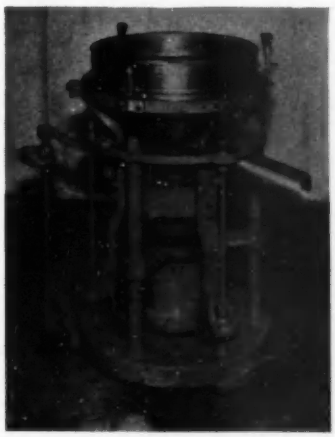
Square Root Calculator

The compact Friden calculator.

AN American company—the Friden Calculation Machine Co. Inc., San Leandro, California—has developed a square root calculating machine, in which it is possible to "feed" the figure for which the square root is required, into the machine, press a button, and the machine does the rest. It will provide the answer up to ten places of decimals—a fantastically-high ratio of accuracy.

The machine, compact and portable, may be operated from any power-plug electrical supply and measures only some 15 × 15 ins. An unskilled operator can be taught to operate the machine rapidly, and the answers may be jotted down as the machine reels them off.

Square-root answers may be "stored" until it is desired to clear. When not required for finding square roots, the machine is so versatile that it may be used for normal calculating, i.e. multiplying, dividing or adding as required.



Stand Unit for Straining Colours

A HIGH-speed stand unit, made by Russell Constructions Ltd., Russell House, 8 - 9 Adam Street, London W.C.2, is being used with excellent results for rapidly straining colours in multi-colour silk-screen printing operations. For "batch" jobs requiring quick and very thorough cleaning between batches, the 5 in. demountable screen eliminates the slow process of cleaning after each colour. The stand unit has a separate sieve and underpan, so that as one colour is finished, the underpan can be removed and cleaned whilst the next colour is being strained. All contact parts can be hosed down ready for the next colour in a few seconds.

Apart from the time-saving factor, it is stated that the colours can be strained more efficiently by the unit, than they can by hand. The stand unit is fitted with a 120 stainless steel mesh, or finer; 1,400 r.p.m. motor, and will strain at a rate in excess of 300 galls./hr.

New Elevating Trolley for Beams, etc.

The "Skysorlift" scissor action elevating trolley in which the lifting mechanism is actuated by either a foot or hand-operated pump

A NEW hydraulic elevating trolley is announced by Farrow and Jackson Ltd., 41-2 Prescot Street, London, E.1. An inclined or horizontal hydraulic ram, lifting heavy duty metal scissor guides, through cams and rollers, provides a strong, positive and smooth action elevating trolley, suitable for long periods of heavy work. The lifting mechanism is actuated by either a foot- or hand-operated pump, the pump unit being provided with a release valve that allows for smooth and controlled descent. The minimum lowered height is 9 ins. and a varying range of lifts can be supplied to suit individual problems and applications.

The "Skysorlift" is fitted with either four swivelling wheels or two fixed wheels and two "stillage" type feet and standard "tug-lift." Individual wheel braking is also incorporated. Tops can be fitted to suit requirements, that illustrated has machined rollers for the easy loading and off-loading of special circular steel formers.

Automatic Ten-Colour Screen Printing

A SEMI-AUTOMATIC screen printing machine designed to apply ten colours simultaneously was recently put into operation in Hungary at the Obuda premises of the Goldberger Textile Works. Little manual labour is needed to operate the new machine in that the methods for colour feeding and printing are entirely automatic.

Though the cost of the machine, with assembly, came to more than 2,500,000 forints (about £75,000) it is expected to pay for itself within nine months.

Claimed to be capable of a speed of 275 yds./hour of high quality dress or furnishing prints, experts from Hungary's Ministry of Foreign Trade, Ministry of Light Industry and from the cotton industry were present to watch the first run of the machine.

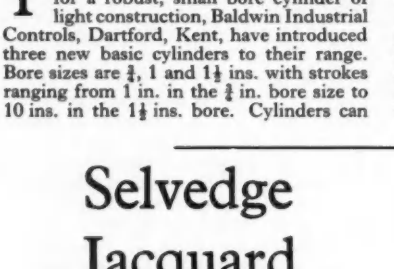
Small Bore Cylinders

TO meet the ever increasing demand for a robust, small bore cylinder of light construction, Baldwin Industrial Controls, Dartford, Kent, have introduced three new basic cylinders to their range. Bore sizes are ¾, 1 and 1½ ins. with strokes ranging from 1 in. in the ¾ in. bore size to 10 ins. in the 1½ ins. bore. Cylinders can be either double acting or single acting with spring return.

These cylinders have been designed primarily for light holding, clamping, or similar jobs where small physical size combined with rugged construction are first considerations. Maximum air pressure is 150 p.s.i., and delivery is ex-stock.

Baldwin small bore pneumatic cylinders

Selvedge Jacquard



IN order to speed up the jacquard for very high speed looms, John T. Hardaker Ltd., Bowling Ironworks, Bradford, have introduced a double-cylinder model of their "Goodwill" selvedge jacquard machine. As will be observed from this illustration, the machine is arranged with a cylinder at each side, these being five-sided for smooth action.

Analogue Computer Working for the Textile Industry

AN analogue computer of modular construction, manufactured by Solartron Electronic Group Ltd., Thames Ditton, Surrey, is now being used for advanced research at the works of British Nylon Spinners Ltd. This computer, it is stated, will allow B.N.S. Ltd. to explore new methods of man-made fibre production and processing without the necessity for building costly pilot plants, or interfering with the actual production plant of the factory. One of the first tasks will be to investigate precise control of yarn tension regulating and spooling, which are vital to the faster, more economic running of textile machinery. Each new technique or development idea can be rapidly tried out on the computer and positive results obtained in a very short time—often inside a few hours, or even minutes.

The computer assembly incorporates twenty-two operational amplifiers, together with their associated linear computing units, servo and electronic multipliers, diode function generators, reference supply, digital voltmeter, oscilloscope, h.t. supplies, etc.

E.C.G.D. Cover for Yugoslav Business

The Export Credits Guarantee Department, 59-67 Gresham Street, London, E.C.2, is now prepared in appropriate cases to insure capital goods business with Yugoslavia on terms of credit extending to five years from date of shipment. Hitherto for this market the limit has been three years from shipment.

South African Reserve Price for Wool

The South African Wool Commission announce that the average reserve price for this season's clip will be 34d. per lb.—the same as in the past two seasons. The commission starts the season with a carry-over of only 26,000 bales equal to little more than a normal week's offerings at auction.

THE TEXTILE
COLOURIST & FINISHER

The Crease-Resisting Process

The Effect on Dyestuffs

Further research is needed to clarify the action of various resinous condensation products and reactants on the light-fastness of dyed fabrics and the protection from photo-hydrolysis of cellulose fabrics containing sensitising dyes

By J. T. MARSH, M.Sc., F.R.I.C., F.T.I., F.S.D.C.

IN the early days of the crease-resisting process with urea-formaldehyde resins, a somewhat rapid survey was made by the writer of the effect of the treatment on various dyes; the investigation was of a preliminary nature, extensive rather than intensive. Since those days of 1932, the subject has been explored in much greater detail by other workers in the field, and particularly by the dyestuffs' manufacturers.

In all cases there is a tendency to improve the fastness to washing; this is of no great moment where the wet-fastness is already of a high order, but it is an important property of the process with dyes of indifferent wet-fastness. Indeed, it may be considered as a separate advantage of the treatment.

The demand for basic colours on cellulosic fibres is relatively small, so that their use with crease-resisted fabrics is unimportant. However, although the light-fastness is improved by the process, the basic dyes still remain fugitive; furthermore, with many basic dyes, the treatment is accompanied by a change in shade which is a further limitation on their use.

Sulphur dyes find relatively little use with rayon, probably on account of the dull character of the colours; many of them show marked changes in shade after the crease-resistant treatment and this is additional to the shade-changes which normally occur on the ageing of the sulphur colours after dyeing. Light-fastness tends to be improved, as also does the wet-fastness.

Direct Dyes

After more than twenty-five years of the application of amino-aldehyde condensation products to cellulose, it has become clear that the direct dyes are probably the most important in this connection.

Most of the dyestuff manufacturers now include in their fastness tables, columns relating to the fastness properties of dyed fabrics which have been treated with resins. The increased usefulness of the direct dyes may be exemplified by two special brochures dealing with resin processed goods. The first is the well-known P-2 of Sandoz which gives exhaustive information on the effect of urea-formaldehyde and of melamine-formaldehyde; there are 75 dyestuffs in the range which are best suited for urea-formaldehyde, and 60 which are suitable for melamine-formaldehyde (and also for urea-formaldehyde). A further 93 dyes are suitable for treatment but behave differently from the untreated dyed material under some of the tests; 33 dyes show a difference in shade which renders them of somewhat limited suitability and a preliminary trial may be advisable.

Informative pamphlets have also been issued by Du Pont and by the National Aniline and Chemical Co.; during the past few years, however, the rapid change of scene in connection with new products, such as dimethylol ethylene urea and the dimethylol triazones, has rendered such pamphlets rather incomplete.

One of the most important effects of the crease-resisting process on direct dyes is the pronounced improvement in the fastness to washing which is evidenced to a far higher degree than from processes such as after-treatments with formaldehyde, or diazotisation and development, which are normally employed for purposes of increasing wet-fastness. This substantial improvement has accounted for the great demand for direct dyes of good fastness to light, for they may thus be made sufficiently fast to washing by means of the crease-resisting process.

This shift of emphasis has meant a greater interest in the metaliferous dyes whose increased light-fastness has often been accompanied by reduced wet-fastness, but this may be compensated by the amino-aldehyde condensation products. Although the wet-fastness before treatment is of little account, provided the dyed material will withstand the simple impregnation process without bleeding into the bath, there is some danger of producing a harsh handle and lower crease-recovery in the final goods because some of the darker shades are washed in salt solutions after dyeing; the introduction of salt does not assist penetration of the resin and may even cause some precipitation of methylene ureas, methylol ureas and similar products.

Very frequently there is some change in shade after the crease-resisting process and the extent to which this may be tolerated is a matter

of choice, but it may often be adjusted in advance. Chlorazol Brown LFS, for example, shows a pronounced change in shade and becomes redder and duller; Chlorazol Black LFS gives a rather bluer tone after processing. The minor problems of change in shade are obviously of more consequence with the lighter colours, but care should also be taken with mixtures of dyestuffs, all of which should equally withstand the subsequent process for otherwise there may be an unwelcome final shade.

There are many direct dyes which show little or no change after the crease-resisting process—Durazol Fast Yellow GS, Durazol Fast Yellow 6GS, Chrysophenine GS, Chlorazol Fast Scarlet 8BS, Chlorazol Fast Scarlet 4BNS, Durazol Grey NS, and Durazol Blue 2GNS—and lists of these are obtainable from most of the dyestuffs manufacturers.

In respect of fastness to light, however, considerable care is necessary in the choice of direct dyestuff; as a wide generalisation it may be stated that the process improves the fastness to light of those direct dyes of lower light fastness, and lowers the fastness to light of those with high fastness to light. Any improvement which takes place is not very striking, but the deterioration may be from a figure of 6 on the S.D.C. scale down to 3 or even less, particularly with such dyes as Durazol Fast Blue GS or Durazol Fast Orange Brown 2RS. In most cases, however, the drop in light-fastness may not be more than 1 or 1·5 units from a figure of 6 or higher; there are also some dyes, such as Chlorazol Fast Pink BKS, Chlorazol Violet NS, Chlorazol Fast Orange RS, Chlorazol Fast Red FS, etc., which show no reduction in light-fastness as a result of the crease-resisting process.

Smith (J.S.D.C., 1949, **65**, 743) has referred to the reduction in light-fastness of most of the blue direct dyestuffs in contrast to the yellow portion of the range; not all blues are affected and it is not easy to understand why Durazol Blue 2GNS and Solar Blue F should be satisfactory whilst Durazol Blue GS and similar types should suffer in resistance to light. In general those dyes which are normally diazotised and developed to improve the wet-fastness are of poor to moderate light fastness, but they show an improvement of 1 or 2 units after crease-resisting.

Some of these problems have been examined by Broden and his colleagues of the Rhode Island Section of the A.A.T.C.C. (Am. Dyes. Rep., 1954, **43**, 6) who prepared a list of 42 direct dyes, 15 of which were improved by the process, 7 were unaffected, and 20 were impaired; the molecular structure of the dyes was then examined in an effort to determine any common characteristics. In most cases, the reactive groups are OH and NH_2, and whilst their number and position in the dyestuff molecule influence the effect of the resin on light-fastness, any attempt to ascribe the effect of the resin to the molecular structure of the dyestuff is very complicated and only a few wide generalisations could be made (Table 1).

It was also found that treatment of the dyed material with formaldehyde and a catalyst often reduced the fastness to light when the NH_2 group is attached to a naphthalene nucleus adjacent to an -N : N- group; treatment with monomethylol urea has no such effect, but dimethylol urea affects the light fastness in a manner similar to that of formaldehyde and catalyst. Increasing the molar ratio of formaldehyde to urea in the resin increases the degrading effect on light-fastness.

On the other hand, Goldstein and Koenig (National Cotton Council Finishing Conference, Washington, 1958) have pointed out that the lowest ratio in commercial use is 1·3 : 1 and this hardly differs in its effect on light-fastness from 2 : 1; furthermore, there is little difference between the action of dimethylol urea and its methyl ether, so that $-CH_2OH$ may not be the essential feature. The type of curing catalyst can be very important particularly if the goods have not been washed after treatment.

For some time it has been known that the type of catalyst exerts an effect on the light fastness of direct dyes which have subsequently been subjected to the crease-resisting process and a less harmful effect is caused by non-ammoniacal catalysts. The observations of Hansen (Z. ges. Text. Ind., 1952, **54**, 40) with regard to zinc chloride were confirmed by Broden and his colleagues who found that test exposures from samples with the zinc chloride catalyst in the crease-resisting process gave only one-third of the fading under the Fadeometer for 24 hours given by corresponding samples with diammonium phosphate as catalyst. Another type of non-ammoniacal catalyst intended to improve the light fastness of direct dyes which are used in conjunction with the crease-resisting finish is Catalyst A of Ciba; this is probably a mixture of boric acid and calcium chloride.

The same organisation has also suggested the use of sodium copper tartrate as an after-treatment (B.P. 609,362) but there are many other copper salts used to improve the fastness to light of those direct dyes, particularly blue dyestuffs, which contain hydroxyl groups. At one time it was customary to improve the wet fastness of direct dyes by an after-treatment with a cation-active substance, such as the salt of a quaternary ammonium compound, but here again it was found that the shade of many was altered and the light fastness was adversely affected.

Table 1

Crease-resistance and Direct Dyes

Dyestuffs		Fadeometer	
		Untreated	Treated
Green BLL	3·00%	50 hours	5 hours
Red F conc.	1·15 „	35 „	2 „
Bordeaux B ex.	0·66 „	35 „	1 „
Violet N conc.	1·00 „	20 „	1 „
Green B conc.	1·20 „	20 „	10 „
Green 3B conc.	2·00 „	20 „	10 „
Brown M conc.	1·00 „	20 „	20 „
Blue 2GL	1·80 „	40 „	10 „
Blue 4GL	2·00 „	50 „	10 „
Blue 5B	1·80 „	10 „	10 „
Sky Blue FF	2·40 „	7 „	20 „
Blue 7GLL	2·00 „	90 „	90 „
Scarlet SE	1·00 „	20 „	45 „
Blue Green BL	3·00 „	75 „	2 „
Scarlet 8BS	1·80 „	10 „	20 „

Azoic Dyes

The behaviour of the azoic dyestuffs towards the crease-resisting process is broadly similar to that of the vat dyes, in that the shade of the majority of combinations is not affected. Although they are used for a similar class of work to the vat dyes, they often give fuller and brighter shades; with reds and scarlets, the all-round fastness may be superior.

Some combinations in the azoic range do not give really satisfactory fastness to light and may be regarded as border line cases, e.g. Brenthol AT and Brentamine Fast Scarlet GG, but there is a marked improvement in the fastness to light after the crease-resisting process. Many other com-

binations show a slight improvement in light-fastness.

Smith (J.S.D.C., 1949, **65**, 743) has stated that there is a general tendency towards improvement in all cases, but the various combinations are not equally affected, nor does any one base or salt show consistency of behaviour. He expressed the opinion that a study of the various individual combinations would provide an almost complete range with improved fastness to light.

Reactive Dyes

The relatively small number of these recent additions to the types of dyestuff available, makes firm pronouncements uncertain at the moment; some members of the class are unaffected but others are adversely influenced in their light-fastness. It also seems that melamine-formaldehyde is more harmful than urea-formaldehyde, and dimethylol ethylene urea is worse than methylol melamine.

It is believed that the Procion class of dyestuffs is based on cyanuric dichloride, and the Cibacrons on the corresponding monochloride; the Remazols, however, are formed from vinyl sulphones and their reactivity is not based on a cyclic system which may possess some residual valency with affinity for chlorine. As a group, the Remazols possess good stability of shade with urea-formaldehyde and melamine-formaldehyde but dimethylol ethylene urea causes a drop in light-fastness where the goods are not washed after curing.

Vat Dyes

In the early days of the crease-resisting process the vat dyestuffs were of much greater importance than they are today, for the great improvement in the fastness to washing imparted to direct dyestuffs by the resin led to their greater use. Nevertheless, the fastness to light of the greater part of the vat dyes is much superior to that of the direct colours. As might be expected, the effect of the crease-resisting process on the wet-fastness of vat dyes is negligible, and the choice of dyestuff is not so critical as with the direct colours, for the greater part show no change in shade as a result of the process.

Smith (J.S.D.C., 1949, **65**, 743) has drawn attention to a pronounced improvement in the light-fastness of some of the yellow and blue dyestuffs, such as Caledon Yellow 5GS and Durindone Blue 4BCS. A curious behaviour appears to come from the joint presence of Caledon Yellow GNS and Durindone Brown GS which exhibit no change when used separately and crease-resisted but when the mixed dyeing is treated with urea-formaldehyde the fastness to light falls to nearly zero, particularly where the yellow shade predominates. Exposure to sunlight produced a noticeable darkening in a few minutes, but the original colour returned after keeping the exposed fabric in the dark for some time.

Since 1952-53 there has been an increasing use of vat dyes with thermosetting resins on cotton, for fast-colour work has become a particularly important factor in the U.S.A. as the yardage of cottons treated for crease-resistance, anti-shrink, and smooth-drying effects increased from 40,000,000 to 500,000,000 yds. over a period of five years, and reached 1,000,000,000 yds. in 1957.

Although the vat dyes are generally regarded as the fastest on cotton, most of the information in connection with their use came from application to rayon in conjunction with the crease-resisting process; some manufacturers, however, were aware of the fading effect with the resin when the dyestuff was present in pale shades, but neither the extent nor the nature of the phenomenon was clear.

The problem has been examined by the Piedmont Section of the A.A.T.C.C. under the chairmanship of Arnold (Am. Dyes. Rep., 1956, **45**, 821). Thirty vat dyes were applied in light and heavy shades to cotton, followed by treatment with methylated methylol melamine or with dimethylol ethylene urea; two of the dyes actually showed less fading after the resin treatment, but only thirteen were unaffected. Two dyestuffs showed an appreciable loss of fastness to light, and one dye exhibited a substantial loss.

Nine dyestuffs were selected from the list of thirty for a more detailed study of the effect of the resin (Table 2). It was fully realised that fastness to light is a property of the dyed system, i.e. the combination of dyestuff and substrate, as pointed out by Stearns (J.S.D.C., 1949, **65**, 746) who drew attention to a new dye-substrate system, i.e. resin-treated cotton or rayon.

It was established that the use of formaldehyde and a catalyst had no effect on the fastness of the vat dyes, in contrast to the observations of the Rhode Island Section under Broden (Am. Dyes. Rep., 1954, **43**, 6) on the fastness properties of direct dyes.

The most important conclusions are connected with the effect of the $-N.CH_2OH$ group which is common to all the amino-aldehyde condensation products. The effect of monomethylol urea and of dimethylol urea is less pronounced than that of either methylol melamine or dimethylol ethylene urea; the effect on the dyestuff increases with the concentration of the resin, but is reduced somewhat by washing after curing, particularly with the higher concentrations of resin. The reaction, if any, between the resin and the dye is not resistant to stripping, for if the resin is removed then the fastness to light reverts to normal.

Another important fact is that with methylol melamine and also dimethylol ethylene urea, it is not necessary to cure the resin to cause the effect on the light-fastness; furthermore, the mere presence of the pre-condensate, even without the catalyst, will produce the effect, which is not due to catalyst, curing temperature, nor to free formaldehyde which may be present.

Attempts to correlate the structure of the dyestuff with the effect of the resin on light-fastness have been without much success, for dyes of similar structure may be affected in one case (Anthraquinone Vat Brown R) but unaffected in another case (Anthraquinone Vat Khaki 2G). One suggested explanation of the results is based on the work of Rembaum and Szwarc (J.A.C.S., 1955, **77**, 4468) who pointed out that free methyl radicals, produced by decomposition of materials containing methyl groups, will react with quinones and other polycyclic aromatic compounds; thus the free methyl radicals might possibly react with the quinoid group of the vat dye molecule and produce a methoxyl group which

Table 2

Vat Dyes and Fading

Dyestuff	Effect of Resin
Anthraquinone Vat Yellow 5GLL ..	Appreciable loss
" Golden Orange 3G ..	—
" Golden Orange RRT ..	Improvement
" Brilliant Orange RK ..	None
" Brown R	Slight loss
Thioindigold Vat Pink FF	None
Anthraquinone Vat Red FBB	Severe loss
" Gray R	None
" Gray 2G	None

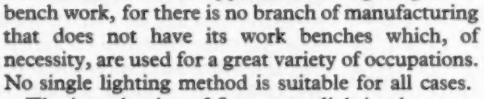
Lighting-2

The general principles of factory lighting have been dealt with in the previous data sheet (No. 6). This one considers briefly certain factors—not always fully appreciated — that influence the lighting for some particular factory applications. The next data sheet will carry the subject further.

Work benches

The most universal application of lighting is to bench work, for there is no branch of manufacturing that does not have its work benches which, of necessity, are used for a great variety of occupations. No single lighting method is suitable for all cases.

The introduction of fluorescent lighting has gone a long way to solving one of the main problems here; for while the high degree of brightness of filament lamps tends to preclude their use for individual lighting owing to the glare, the fluorescent tube with its greater expanse of light source has made localised lighting with a low mounting height more practicable. Moreover, the length of the fluorescent tube puts into the hands of the designer a means of controlling shadows which, together with glare, probably represent the most prolific causes of errors and eye-strain.



With narrow individual benches (not more than 4 ft. wide), there are four basic methods of localised lighting: longitudinal, transverse, diagonal or a combination of longitudinal and transverse. With wider benches it is not advisable to use fittings directly over benches, and fittings should be behind the workers at each edge of the bench. Where particularly high illumination is required, fluorescent fittings may be mounted as local lights—low enough for the skirt of the reflector to conceal the lamps from the eye of the operator.

It is good practice to use reflectors which allow a reasonable amount of light to spill upwards, giving a certain amount of general lighting.

High-bay shops

Probably the most difficult of all factory lighting problems is that of high-bay lighting. In lofty, long and sometimes necessarily dirty shops such as those which house really large machine tools and overhead cranes, which do their worst to defy the efforts of the illuminating engineer, it requires great ingenuity, coupled frequently with high lamp wattage, to provide the workman with enough light to allow him to do his job efficiently. From the planer operator to the slinger, the workman, though he may not know it, is dependent on good lighting if he is to avoid an over-cut or a serious crane mishap.

The major problems associated with the lighting of high and relatively narrow shops, such as heavy machine shops and foundries, are :—

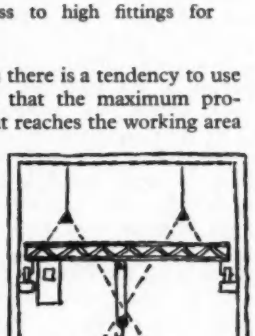
(a) Poor light utilisation caused by excessive light absorption by the large and often dark wall area.

(b) Preponderance of light flux downwards and poor cross lighting causing poor illumination on vertical surfaces, and heavy shadows.

(c) Possibility of heavy light absorption in the atmosphere.

(d) Difficulty of access to high fittings for maintenance.

In high-bay workshops there is a tendency to use concentrating fittings so that the maximum proportion of the light output reaches the working area without spread to the walls, but the saving in wall absorption is obtained only by accepting a depressing environment, poor cross lighting and heavy shadows.



In many cases it is good practice to accept the inevitable reduction in light utilisation by wall absorption and to reduce this by applying light colours to interior surfaces where possible throughout. This approach results in more cheerful conditions and provides equally good illumination values and better cross lighting. Even better is to add angled lighting from the sides below crane level.

In the conditions obtaining in this type of shop, rapid deterioration in light source intensity due to dust must be expected. Facilities should always be provided for easy access to fittings for cleaning and maintenance.

For further information, get in touch with your Electricity Board or write direct to the Electrical Development Association, 2 Savoy Hill, London, W.C.2. Telephone: TEMple Bar 9434.

Excellent reference books on electricity and productivity (8/6 each, or 9/- post free) are available—"Lighting in Industry" is an example.

E.D.A. also have available on free loan in the United Kingdom a series of films on the industrial uses of electricity, including one on industrial lighting. Ask for a catalogue.

7931

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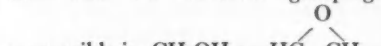
would destroy the chromophoric structure.

Later work (Am. Dyes. Rep., 1958, **47**, 39) revealed that the amino-aldehyde resins were not alone in causing these fading effects but that other resins also produced similar results although they did not exert the same relative fading effect, on the different vat dyes among themselves. For example, acrolein-formaldehyde caused severe fading before curing but slight fading after curing; epoxy resins showed increased fading after curing in a few cases, and monomethylol dimethyl hydantoin also produced increased fading on a few dyes. Acetone-formaldehyde-starch preparations showed some fading effects in certain dyestuffs. From these data it was concluded that various chemical types of resin can cause increased fading of vat dyes on exposure to light, and that the common grouping



responsible is $-CH_2OH$ or $-HC-CH-$.

The effect of the resin on light-fastness is only dependent on concentration up to some point between 1 and 5%, the exact concentration depending on the particular dyestuff; although the catalyst need not be present to cause the effect, it was noticed that zinc nitrate hinders the fading in some cases presumably by stopping the generation of free radicals.

An important observation was the existence of some correlation between those types of dyes whose light-fastness is sensitive to resin treatment and dyes which degrade cotton photo-chemically as a result of the generation of hydrogen peroxide. The latter effect has been discussed by Scholefield and Goodyear (Textilber., 1929, **10**, 867), Fox (J.S.D.C., 1949, **65**, 528), Egerton (*ibid*., 1949, **65**, 764), and Ashton, Clibbens and Probert (*ibid*., 1949, **65**, 650); a list of dyestuffs was given by Fox, dyes from flavanthrone being inactive in tendering, whereas those from pyranthrone were active.

Following upon the suggestion that the peroxide developed by the dyes caused the generation of free radicals from the resins, which in turn cause an irreversible reduction of the quinoid linkage in the dye, an inhibitor was tried as an acceptor of hydrogen peroxide and of free radicals; the unsaturated ester, diallyl phthalate, brought about a definite reduction in the amount of fading essentially as though there was no resin. The ester is not very effective at low concentrations, possibly on account of its volatility during curing.

Dispersed Dyes

Although the crease-resisting process is not applied to acetate rayon on any substantial scale, there is nevertheless sufficient treatment of fabrics of mixed fibres to bring the effect of the resin on the dyestuff into consideration. In general, the dyestuffs for acetate rayon are not appreciably affected in fastness to light; a similar state of affairs obtains with regard to change in shade as a result of the process, but to a much smaller extent than with the direct dyes, and it is not necessary to consider the effect of the resin on dyed acetate rayon in such detail.

General

Goldstein and Koenig (supra) are of the opinion that dimethylol-ethyleneurea is the worst offender in connection with light-fastness, followed by guanyl-urea-formaldehyde, melamine-formaldehyde, dimethylol-triazone, and finally dimethylol-urea. They hold that the light-fastness of the four main classes—directs, azoics, reactives and vats—are all more or less affected as classes, both in the positive and negative behaviour; the degree of fading is different in different classes. It is thought that the effects are not due to chemical reaction but to some form of light-screening phenomena.

Photo-Sensitivity

For many years prior to world war II, it had been known that certain dyestuffs, particularly the yellow and orange vat dyes, were photo-sensitive and produced substantial damage to cotton and rayon when exposed to light. This phenomenon has been described by Schofield and Goodyear (Textilber., 1929, **10**, 867).

In the early 1930s some investigations were carried out on the effect of urea-formaldehyde resins by Marsh and Wood (see "An Introduction to Textile Finishing"; Marsh; Chapman and Hall; London; 1946, page 422); this work may have been inspired by the reference to the protective action of thiourea on silk according to Ristenpart (Angew. Chem., 1909, 22, 18) and Sisley (Rev. gen. mat. col., 1911, **15**, 337)—see also Egerton (J.T.I., 1948, **39**, 293).

It was shown by Wood that the standard crease-resisting process with approximately 15% of resin exerts a substantial degree of protection when viscose rayon is exposed to ultra-violet light (Table 3).

At the same time similar experiments were carried out by Marsh with rayon which had only been treated to contain 7·5% of resin with a view to making it anti-shrink and possibly suitable for casement fabrics (Table 4).

Table 3
Photo-degradation of Viscose Rayon

Treatment	Breaking Load Dry	Wet
Untreated and unexposed	63 lb.	31 lb.
Untreated and exposed	30 „	nil
Treated and unexposed	83 „	63 lb.
Treated and exposed ..	80 „	57 „

Although the anti-shrink treatment conferred a substantial degree of protection, it was not so great as that given by the full crease-resisting process.

Table 4
Photo-degradation of Rayon

Treatment	Breaking Load Dry	Wet
Untreated and unexposed	60 lb.	30 lb.
Untreated and exposed	20 „	nil
Treated and unexposed	74 „	39 lb.
Treated and exposed ..	59 „	21 „

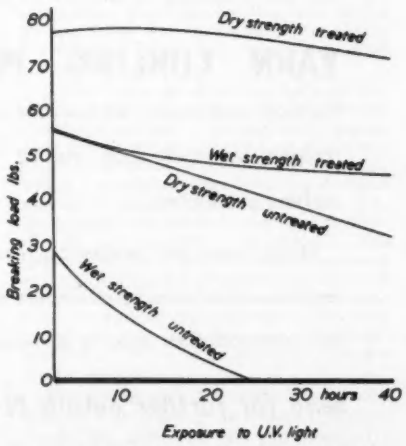
A somewhat similar series of experiments was carried out by Marsh with dyed viscose rayon, containing 8 to 10% of urea-formaldehyde and exposed to sunlight (Table 5).

It will be noted that the resin exerts a considerable protective influence even in presence of those vat dyes whose action accelerates photo-degradation of cellulose.

Some further results demonstrate the rate of photo-degradation of rayon under ultra-violet light; in this case the fabric consisted of filament rayon containing 12% of resin (Table 6).

At the present time, the whole question of the protective action of amino-aldehyde resins requires further elucidation, but probably before that can be done there is need for much more work on the actual mechanism of photo-degradation and sensitising dyes.

(*continued on page 472*)



Rate of photo-degradation of filament viscose rayon. untreated and treated with 12% urea-formaldehyde resin.

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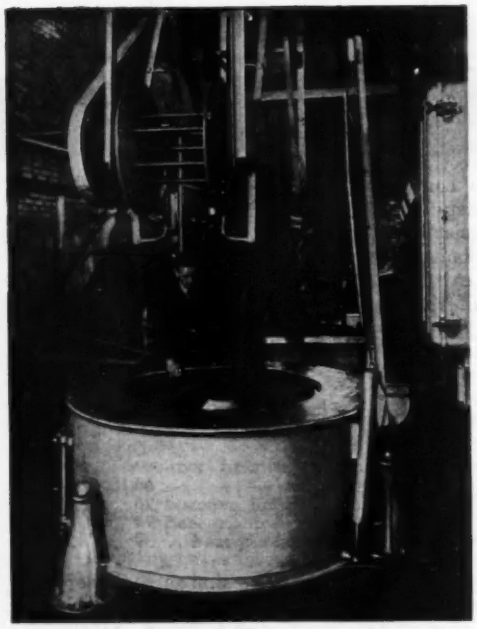

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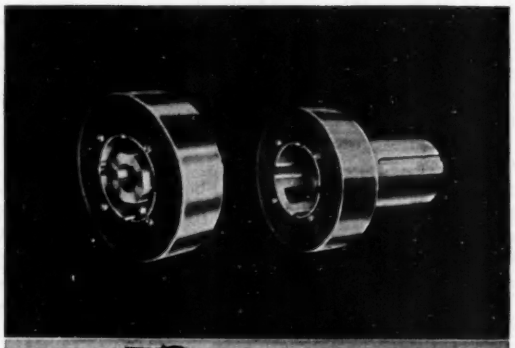

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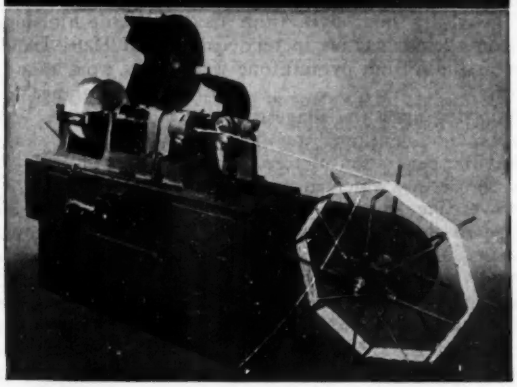

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Resitex—Self Smoothing Fabrics

PRESENTING the first paper at the congress of the International Federation of Associations of Textile Chemists and Colourists held recently at Church House, Westminster, Mr. J. T. Marsh (Great Britain) outlined the advantages of resin treatments. Although the property imparted was often called crease-recovery, it was accompanied by many other outstanding improvements and no really satisfactory single word had been found to embrace them all. Some of the effects obtained were:—

(1) Improved resistance to and recovery from creasing.
(2) Smooth-drying properties after laundering.
(3) Durable effects may be imparted by immediate mechanical treatment.
(4) Reduced laundry shrinkage.
(5) Increased dry tensile strength and greatly increased wet tensile strength of rayon.
(6) Improved fastness to washing and rubbing of most dyes.
(7) Decreased water-imbibition and more rapid drying.
(8) Improved handle and drape of fabrics.
(9) Increased weight.
(10) Increased resistance to distortion of fabrics, with improved retention of garment shape and freshness.
(11) Improved resistance to slippage and fraying.
(12) Vehicle for modern flameproofing agents.
(13) Increased resistance to photo-degradation and weathering.
(14) Increased resistance to rotting.

Three finishing developments should be mentioned as additions to the original crease-resisting property with concomitant additional advantages. First, there were the durable mechanical effects such as the well-known Everglaze embossed and glazed finishes. Secondly, there was the more recent smooth-drying finish, the possibility of which dated back to 1944, but which had been developed along with a similar property in synthetic fibres since 1954. Thirdly, resin-treatment seemed to form the basis of a number of durable flame-proofing treatments, such as urea phosphate, THPC, BAP and APO, used in conjunction with or as part of the resinous precondensate.

Speaking of self-smoothing fabrics Mr. Marsh said these were the latest development in finishing technique, and the term was intended to include wet and dry crease-recovery, wash-and-wear, minimum-iron and many other features of considerable textile value. Referring to the changes in physical properties of cotton and rayon which accompanied the absorption and desorption of moisture, Mr. Marsh said that it was well known that with both cotton and rayon the extension at break increased with increase in moisture content, but, whilst the tensile strength of cotton increased, that of rayon diminished, it was not sufficiently appreciated that with decrease in moisture content the extensibility of cotton and rayon diminished: but the strength of the former fell while that of the latter rose. Hence there was close agreement between the effects of drying on crease-recovery, strength, and extensibility, and the effect of internal resin formation on the same properties: both may be attributable to molecular entanglement—unstable or stable—the disruption of which caused the return of the original properties in both cases.

Crease-recovery by resin formation, however, was not believed to be due to a form of permanent dehydration for when the moisture content of resin-treated cellulose was estimated on the cellulose rather than on the cellulose plus resin, it followed the normal course: furthermore, the recovery from creasing of the treated fibres varied with relative humidity and followed the normal curve for moisture absorption.

The conventional crease-resisting processes, however, included a final condensation of the resin, at temperatures of around 140°C. or even higher, under substantially anhydrous conditions. It was suggested, therefore, that a considerable amount of reticulation takes place which depended mainly on the formation of very strong junction points, where the synthetic resin acted as the bonding medium between the molecular chains: this was supplemented by junction points of hydrogen bonds formed at the high temperature, which were probably stronger than normal. In this way, the network system was stabilised by cellulose-resin-cellulose bonds at intervals, supplemented by heat-formed cellulose-cellulose bonds: it also contained some of the usual hydrogen-bonded junction points.

The thermosetting resins themselves formed three-dimensional networks, so that there was a highly complicated structure of a resin network within an amorphous network within a network of molecular chains and crystallites: it was not surprising that the treated material exhibited good crease-recovery.

Regarding premercerisation, the difference in result between resin treatments of mercerised and unmercerised cottons had been confirmed by American work in which both urea-formaldehyde (10 - 12%- and melamine-formaldehyde (6 - 7%) were employed. Treated unmercerised cotton gave a breaking load of 26 lbs. or 40% fall in strength whilst treated mercerised cotton gave a breaking load of 34 lbs. (23% fall).

Mr. Marsh observed that no really satisfactory explanation had been forthcoming for the "ageing" of crease-resisting goods when the initial recovery continued to improve for 7 - 14 days after the original treatment.

Reactive Dyes for Nylon*

THE final paper of the Congress was given by D. F. Scott and Dr. T. Vickerstaff (I.C.I., Dyestuffs Division, Manchester).

Hitherto, it was noted, conventional dyes for nylon had suffered from the disadvantage that those of good fastness properties did not readily cover the chemical and physical irregularities of the fibres, whilst those which were free from these defects had relatively low fastness properties.

The success of reactive dyes applied to cellulose fibres inevitably suggested a further line of attack. Procion dyes did not, of course, provide the answer, since, being anionic in character, they suffered from the same defects as acid dyes, but the high degree of wash fastness shown by Procion dyes on nylon encouraged further speculation. What was clearly needed was a dye without ionic solubilising groups, capable of dyeing in the same level manner as a disperse dye and capable of becoming reactive when inside the fibre.

Evidence was available that the Procinyl dyes reacted with nylon under alkaline conditions. It had been shown fairly conclusively that this reaction did take place, but did not indicate the precise mode of attachment. This was a matter of considerable interest, since if reaction took place only on amine end-groups, the difficulties associated with saturation may again arise. However, reaction with amide groups along the nylon chain was also a possibility. These two possibilities had been examined.

If each molecule of dye reacted with one amine end-group, this should be demonstrable by estimating the number of amine ends left unreacted after dyeing. This had been determined by the standard method, which consisted in dissolving the fibre in phenol-methanol and titrating conductrimetrically with a standard hydrochloric acid solution in methanol. The amounts of dye estimated colourimetrically and the amine and sites occupied are in good agreement up to the point at which these sites are completely saturated. Over this range of dye concentration, therefore, reaction appeared to occur solely with the amine groups.

However if the dye reacted only with primary amino groups in the fibre, a point would be reached with increasing dye uptake when no more sites would be available for reaction and a limit would be

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imposed to the amount of dye retained after extraction with propanol. For a nylon containing 42·6 milliequivalents of amine ends per kilogram of fibre, the maximum theoretical amount of dye which could be retained on this basis was approximately 1·8 - 2·0 g./100 g. but much larger quantities could be fixed on the fibre.

There were two possible explanations of this observation:—

(*a*) The production of fresh primary amine sites by the hydrolysis of amide links.
(*b*) Reaction of the dye with amide groups.

Degradation of nylon under the pH conditions used for dyeing was unlikely, since the fibre was normally stable to alkali other than caustic alkali at elevated temperatures, and the acids required to achieve hydrolysis were either mineral acids or strong organic acids. Since degradation as judged by tensile strength and extensibility did not occur to any significant extent, it could be inferred that amide hydrolysis played a negligible part.

Discussing the dyeing properties of Procinyl dyes, Dr. Vickerstaff said tha like other reactive dye systems, these dyes underwent a side-reaction with water, and to minimise this it was desirable, as with Procion dyes on cellulose, to absorb the dye on to the fibre initially in an unreactive form. However, the main advantage to be gained in this manner was in terms of levelling rather than degree of fixation. With Procion dyes on cellulose the preliminary absorption may be brought about by adding electrolyte to the neutral dyebath followed by the addition of a suitable alkali. Procinyl dyes, on the other hand, were relatively insensitive to electrolyte concentration. Fortunately, however, adequate absorption took place from acid suspensions, in which the dyes were relatively inert. This allowed an efficient two-stage system to operate, first by absorbing the dye in presence of acid followed by reaction in alkali.

The introduction of Procinyl dyes represented a further development in the field of reactive dyes for textiles. This application of the principle of reaction between dye and fibre made it possible to combine good levelling properties with high wet fastness, by dyeing first in an acid dyebath, in which levelling took place, and then in an alkaline dyebath, in which reaction with the fibre occurred. This process was simple, may be carried out in conventional machinery, and did not entail the use of abnormal dyeing conditions or special reagents. By the use of Procinyl dyes it was now possible to dye nylon textiles to fast, bright colours with excellent coverage of fibre irregularities.

The Pad-Roll Process

RECENT advances in the application of the pad-roll process was dealt with by Messrs. C. O. Erikson, N. Landqvist and B. Mellbin, of Sweden. Their aim was to describe some recent experiences with special reference to productive conditions.

Regarding reactive dyes, in most cases a padding temperature of 40°C. had given satisfactory results for the hot-dyeing dyes, with an immersion time of about 1·5 secs. For the cold-dyeing dyes, the low temperature of 20°C. and the short immersion time would not always be able to eliminate dye exhaustion in the padder trough and the resulting tailing. For some dyes, with very bad properties in this respect, still lower temperatures had been tried, e.g. 14°C. but without complete success. There was, therefore, a need for a product which reduced substantivity of the cold-dyeing reactive dyes at low but not at high temperatures. Products of this type, suitable for direct dyes, had been on the market for several years, but it was not quite clear whether they were satisfactory for the above purpose.

Referring to the dyeing-in period, after padding, the speaker said that the following steps had to be observed if the pad-roll principle were to be adhered to closely. The temperature of the fabric, preferably obtained by infra-red heating, and the wet-bulb temperature of the chamber during the subsequent period, had to be substantially the same. It was essential that the temperatures were kept constant during the whole run, right from the beginning, and it was therefore necessary to inject steam into the chamber before starting up. With reactive dyes these rules had to be given more careful attention than with direct dyes. There were several reasons for this: the low substantivity at high temperatures which characterised many of the reactive dyes and the occurrence of two competing reactions—between the dye and the fibre and between the dye and the water respectively. First, if the wet-bulb temperature of the chamber exceeded the temperature of the fabric when wound up, the fabric batch would be heated from the outside inward as long as a temperature difference existed. This difference might cause migration of the dye in the same direction as that of the heat transfer, since the lower temperature meant a higher substantivity.

If no chemical reaction occurred, differences in dye concentration due to this would be equalised after a very long period by back diffusion. However, since irreversible chemical reactions occurred at the same time, back diffusion would not eliminate the differences. It could also be mentioned, said the speaker, that in some cases the increased reaction rate at higher temperatures would counteract the effect of the difference in affinity and tend to produce a concentration gradient in the opposite direction. Altogether, these effects would sometimes give rise to a more or less sharp borderline between the dark sections of the fabric and the pale areas. However, when the heating and the wet-bulb temperatures were controlled, those difficulties were avoided.

Under very delicate conditions, e.g. with sensitive fabrics and dyes, it may be of value to add an electrolyte to the dye solution, in order to increase the substantivity. It may also be advisable to keep the dyeing-in temperature as low as possible and accept a long time of dyeing, since it is then easier to control the temperature conditions. The actual dyeing temperature would be a compromise based on experience, the dyemakers' bulletins and laboratory tests.

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Applications of Reactive and Direct Dyes to Rayon Staple

THE wet processing of textile materials by continuous means was a worthwhile objective, said Mr. R. C. Cheetham (Courtaulds Ltd., Manchester) if the following requirements could be met:—

(1) Relatively large weights for processing in a particular manner.
(2) Fastness in the case of dyed goods equivalent to normally accepted standards.
(3) Satisfactory performance of the processed material in subsequent operations.
(4) Lower capital cost of plant compared with conventional processing, related to equivalent production rates.

It seemed probable that continuous dyeing could now be extended to staple fibres in appropriate fields. One such field was the carpet trade, with a large consumption of dyed staple fibre for the plains and ground colours of conventional carpets and for tufted carpets.

Mr. Cheetham then went on to summarise methods for adapting textile-processing machinery to continuous dyeing. Mainly existing machines used for processing staple fibre to yarn and for scouring and drying had been considered and the necessary modifications made to accommodate the application of the appropriate dyes to "Fibro" in the form of a fibre lap. In close collaboration with Meschinenfabrik Fleissner and Sohn, Egelsbach, West Germany, the revolving drum principle already in existence for drying purposes was adapted and embodied in a range of machines for the dyeing and finishing "Fibro" staple. An alternative method was being developed with the

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assistance of A. E. Callaghan and Sons Ltd. (Birfield Engineering Group) based on existing plant intended for the manufacture of bonded non-woven fabrics. The fibre lap is passed between two endless mesh belts through a dyebath formerly used as the impregnation bath for bonding media.

Conventional wool-scouring bowls normally used for either raw wool or yarns have also been considered in view of their present use for continuous processing. Although initial trials have been carried out with limited success, the incorporation of scouring bowls in a continuous dyeing system for viscose rayon staple requires much more development.

In addition to the foregoing, some attention has been given to the use of a scouring range for continuous dyeing. At first sight, such a method had possibilities, since a scouring range was already providing a means of conveying material in a continuous manner. It was known, moreover, that scouring bowls were being used in America for dyeing of loose wool with metal-complex acid dyes, apparently successfully. Such a method had been described by D. R. Lemin in some present work on continuous methods.

A trial, therefore, was carried out on a raw-wool scouring machine fitted with harrow, but the high liquor ratios created difficulties for the dyeing of cellulosic fibres in anything but very pale colours. The conveyance of the wet fibre was not very satisfactory, nor were the squeezing arrangements suitable for "Fibro." It was possible that raw-stock scouring bowls could be made to work if means were provided for carrying the fibre more rapidly through the dye liquor, and squeezing made more efficient so as to give consistent expression.

An experimental machine—a Petrie and McNaught yarn-scouring machine—intended essentially for more efficient scouring of woollen and worsted yarns, was also tried. The machine was shorter in length than the conventional yarn-scouring range. It had overhead delivery of liquor by shower from tanks erected above a brattice, the liquor being returned by a circulatory system.

Preliminary trials with cold-dyeing Procion dyes had been carried out on such a machine with limited success. The relatively long exposure of fibre to dye liquor suggested that this machine would be more suited to dyeing than padding.

After a consideration of dyes for the continuous dyeing of "Fibro," Mr. Cheetham summarised a comparison of dyed and mass-dyed fibres.

The work of evaluating the various possible methods of continuously dyeing "Fibro" was proceeding with all practicable dyes, and it may be some time before final conclusions may be drawn. The economic considerations must clearly be set against quality of product, and dyed "Fibro" would always tend to be compared with "Fibro-Duracol." "Duracol" colours have the undoubted advantage with regard to wet fastness, but it may well be that for inexpensive floor coverings, and experience suggests this to be the case, high wet fastness is by no means invariably required.

It would become necessary to ascertain at what point the continuous method for stock dyeing and mass-dyeing began to offer their respective advantages. It was most likely that the two systems would be complementary rather than competitive.

New One-Bath Method

ONE of the difficulties met with in the different continuous dyeing methods for vat dyes arose from the fact that, in general, leuco vat dyes had high but differing affinities for the material to be dyed. It would, therefore, be attractive to have at our disposal bath compositions which did not reduce the vat dyes at room temperature, but would cause reduction at higher temperatures, said Mr. F. L. J. van Lamoen and Mr. H. Borsten (Holland), in a paper on a new one-bath method for continuous or pad-roll vat dyeing.

To a certain extent these requirements may be met by using sodium formaldehyde-sulphoxylate instead of sodium hydrosulphite as was usual in vat printing. It had now been found, however, that if to a bath containing sodium hydrosulphite more formaldehyde was added than was necessary for the formation of sodium sulphoxylate, a less negative bath potential could be obtained at room temperature than by using sodium formaldehyde-sulphoxylate only. This method enables the authors to choose a dyebath composition fulfilling conditions required for most vat dyes used in dyeing practice. A further merit of these dyebaths was in their excellent stability at room temperature: moreover, they were very well adapted for continuous dyeing, affinity difficulties being obviated.

In connection with the development of the new method, even if an attempt were made to use the plant available in the larger dyehouses, certain items of machinery would necessarily have to be altered to meet the specific requirements of the process. Therefore it was not surprising that, although it was intended to develop the new method on a fully continuous scale, during more recent experiments greater attention had been paid to a practical development using a pad roll machine. This did not mean, however, that a fully continuous process was an impossibility. Some large-scale experiments had shown that a pad-steam installation may give satisfactory results.

The new one-bath method for continuous vat dyeing could be used in both pad-steam installations and pad-roll machines. Although at the present time full details are not available concerning the best procedure, it is expected that the method developed for the continuous vat dyeing of relatively short lengths of cloth is most promising if pad roll machines are used.

Experiments were made on the mill scale with a pad-steam installation and a pad roll machine. In the laboratory experiments a two-roll horizontal pad was used: in the mill experiments two-roll horizontal and vertical pads were available. In general, it may be concluded that all the padding mangles which can be used for the continuous dyeing of direct dyes give no difficulties during the dyeing process.

During fully continuous dyeing, where a pick-up of 90 - 100% is required to obtain the best results, some difficulties are encountered with mercerised cloths. During pad roll dyeing a somewhat lower pick-up is allowed. It may be possible that the padding mangles giving unsatisfactory results during continuous direct dyeing, will give fewer difficulties during the vat dyeing process described, as the dye is in the oxidised form and has no affinity for cellulosic material. However, preferential sorption of either the dye or the vehicle, which may take place in padding and cause tailing, must be avoided, although during the shorter runs for which the process has been developed the tailing effects may be of minor importance.

The experiments with both continuous and pad roll machines on a practical scale are not yet complete. For this reason, full details of the process could not be given. However, the results obtained with the pad roll machine indicates that a technical realisation of the process may be expected within a reasonable time. In principle, any apparatus in which a fabric may be heated to about 100°C. with exclusion of air may be used for the reduction of the dye.

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Continuous Dyeing of Wool and Mixtures

WHEN Messrs. H. Ris, H. R. Hirsbrunner, A. Schaeuble, and C. Soiron (Switzerland), spoke on the subject of recent developments in the continuous dyeing of wool and mixtures of wool with synthetic fibres, it was explained that as a result of recent research, novel continuous or semi-continuous dyeing methods had been developed which offered entirely new possibilities in practical dyeing. The methods could be applied to wool slubbing, woollen fabrics, ski gaberdine cloths made of wool and crimped nylon crepe, and similar fabrics.

Projects for the continuous dyeing of wool were many and various: and yet, with the exception of the du Pont process, which was used to a limited extent in the United States, none had proved practicable. The reasons for this were doubtless numerous, but essentially they were (*a*) that these methods did not offer sufficient economic and technical advantages over conventional batch methods and (*b*) that they were accompanied by practical and mechanical difficulties, associated especially with fixation and development.

"It would be wrong to blame the wool industry for this backwardness in dyeing

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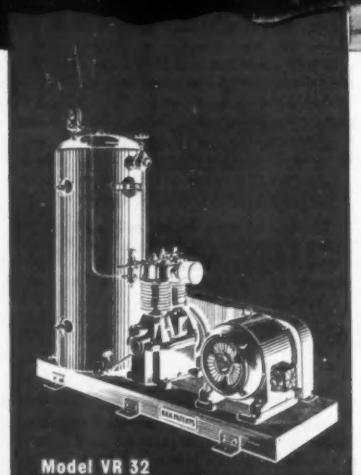

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methods—for backward it is, compared with the cotton industry," said Dr. Ris. "Indeed the industry itself has shown a very lively interest in the practical operation of continuous, or at any rate semi-continuous, dyeing methods. This interest stems from economic as well as technical considerations," he said. Continuous dyeing offered the following major advantages:—

(1) Greater economy.
(2) Improved quality of wool.
(3) More level dyeing.

The starting point of their investigations was the "acid shock" process of Casty and Krahenbuhl.

Their improvement on the acid shock process consisted in using a pad liquor containing weakly acid-dyeing 2 : 1 metal-complex dyes or selected weakly-acid dyeing wool dyes of the Irganol S. type, toge.her with assistants to prevent bleeding in the acid bath. Otherwise, the procedure was the established one of padding, drying or steaming, followed by a short treatment in an acid bath at the boil or 60°C. The special composition of the pad liquor ensured rapid and complete fixation and development of the dye, so that virtually none of it bleeds into the acid bath.

At its present stage of development the pad-steam-acid fixation process could be said to offer the following advantages in continuous dyeing:—

(1) Short dyeing times.
(2) Simple dyeing cycle and mode of operation—simple conversion of normal dyeing recipes, easy matching, easy shading, and simple washing off of thickening.
(3) Minimum handling of slubbing, hence—
(4) Beneficial effect on spinning (even slub-free yarn).
(5) Fastness properties as good as those obtained by normal batch methods.
(6) Very level dyeing in spite of varying thickness of slubbing.
(7) No substantivity effect and no bleeding in the acid bath, hence—
(8) End-to-end levelness of dyeing.
(9) Better cover of tippy wool, wools of different quality and fineness, and wools of different origin.
(10) Ability to use mixed wools of different dyeing properties without loss of quality.

Regarding the continuous dyeing of wool and wool-polyamide crimped-fibre fabric, pad-dyeing of wool and wool-synthetic fibre mixture fabrics was as yet in its initial stages. The practical and mechanical difficulties had faced researchers with considerable problems. The new pad-dry-acid fixation process filled an important gap in the techniques of fast wool dyeing, and it included the following important advantages.

Wool and wool-polyamide fibres could be pad-dyed continuously or semi-continuously. The 2 : 1 metal-complex dyes could be used as well as selected acid wool dyes to produce pale, medium and even full colours almost without restriction.

The highest fastness is obtained without difficulties in regard to levelness. Perfectly solid results can be obtained without difficulty on wool-polyamide mixture fabrics. Damage to the wool fibre is kept to a minimum owing to the very brief exposure to high temperatures and swelling media. In particular, the elasticity of the polyamide crimped-fibre fabric is fully preserved.

Effect on Dyestuffs

(*continued from page 468*)

The photo-chemical degradation of cotton can be accelerated by the presence of a sensitising dye even though there is no direct contact between the dye and the cotton; this action is probably due to hydrogen peroxide but there must also be some activated oxygen according to Egerton (J.T.I., 1948, **39**, 305). Although one might expect both cotton and rayon to be affected in a similar manner, this is not so; for example, under similar conditions of exposure undyed viscose rayon only lost 17% of strength in dry or moist atmospheres, whilst cotton lost 23% strength when dry and 42% strength when moist. It is clear that rayon is more resistant than cotton to photo-chemical oxidation by small amounts of hydrogen peroxide.

The role of any protective agent has not been determined with any certainty and it is not known whether they increase the stability of the fibre or themselves suffer oxidation. In the case of tannin or thiourea on silk, it has been shown by Egerton (J.T.I., 1948, **39**, 293) that their protective action diminishes on prolonged exposure from which one assumes that they themselves suffer oxidation.

An important paper by Fox (J.S.D.C., 1949, **65**, 508) gave a list of the vat dyes which show some degradation of cellulose on exposure to light, and also mentioned the belief that there is a relation between fastness to light and activity, although this is not always so.

The subject of photo-chemistry in relation to textiles was discussed in a symposium of the Society of Dyers and Colourists in 1949 (J.S.D.C., 1949, **65**, 585) during the course of which it was pointed out by Ashton, Clibbens, and Probert (*ibid.*, 1949, **65**, 650) that the photo-chemical oxidation of cellulose is sensitised by sulphur and basic dyes, as well as by vat dyes; with sulphur dyes there is a correlation between colour and sensitising action, but this is not the case with the basic dyes.

In connection with the photo-degradation of rayon in presence of certain vat dyes, this may also be minimised by the protective action of combined formaldehyde as distinct from amino-aldehyde condensation products; better results are obtained with thiourea-formaldehyde, according to Boulton (23rd International Congress of Pure and Applied Chemistry, 1950).

In conclusion, it seems that there is a distinct need for further research to clarify the action of various resinous condensation products and reactants on the light-fastness of dyed fabrics and the protection from photo-hydrolysis of cellulosic fabrics containing sensitising dyes.

Table 5
Photo-degradation by Sunlight

Treatment	Blue		Yellow		Green	
	Dry	Wet	Dry	Wet	Dry	Wet
Untreated and unexposed	60 lb.	27 lb.	98 lb.	42 lb.	60 lb.	30 lb.
Untreated and exposed ..	47 „	19 „	46 „	nil	47 „	12 „
Treated and unexposed ..	80 „	35 „	120 „	52 lb.	84 „	48 „
Treated and exposed ..	53 „	24 „	91 „	38 „	65 „	33 „

Table 6
Rate of Photo-degradation

Treatment	Exposure in Hours				
	0	10	20	30	40
Untreated, dry strength ..	55·0	51·5	43·5	37·5	33·5
Untreated, wet strength ..	27·0	14·0	5·0	nil	nil
Treated, dry strength ..	77·0	77·5	76·5	74·0	71·5
Treated, wet strength ..	55·0	52·5	48·5	47·5	46·0

Leesona - Holt Ltd.

Mr. F. Holt and Mr. R. Leeson jointly announce that the business of Thomas Holt Ltd., manufacturers of textile machinery, has amalgamated with Leesona Corporation (formerly Universal Winding Co.), Providence, R.I., U.S.A. The business will operate in Rochdale and Darwen as a subsidiary of Leesona Corporation under the name of Leesona Holt Ltd. As chairman of the new company, Mr. Leeson stated that the business will be carried on in the same manner as previously. All current orders will be fulfilled and existing facilities and services will continue to be at the disposal of the textile industry. The branch of Leesona Corporation in Manchester will be amalgamated with Leesona Holt Ltd.

* * *

THE METRO-VICK GAZETTE. An article of vital interest to spinning technicians is included in a recent edition of the "Metro-Vick Gazette," Trafford Park, Manchester 17. Written by F. W. Cox, M.Sc., M.I.E.E., the article reviews difficulties involved in controlling spindle rotation to accord with yarn tension and their solution by dual motor drive.

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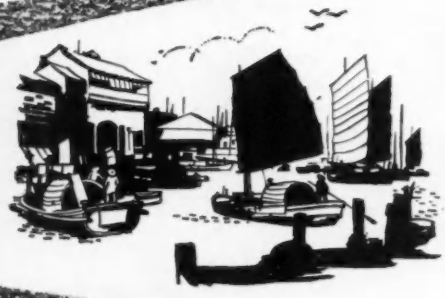

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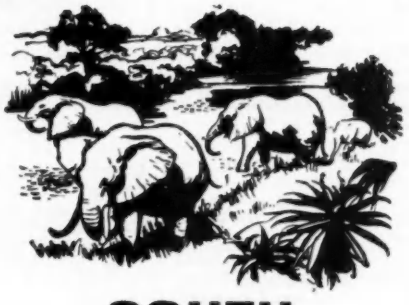

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Change in Colour of Vat Dyes on Soaping

THE effect of structure on the change in colour of vat dyes on soaping was discussed by another Swiss representative, Mr. J. Wegmann. A "soaping" with boiling soap or detergent solution was essential with vat dyeings in order to stabilise the colour and obtain the best fastness properties, he said. The accompanying changes in colour, which were sometimes very characteristic, had aroused the greatest practical and theoretical interest.

At first it was thought that incomplete re-oxidation might be the cause, but later this was replaced by dye aggregation. This idea was developed into the theory that the dye particles undergo a transition from the amorphous through the molecular to the crystalline state. This theory was generally accepted, although it was pointed out that some facts could not possibly be explained on this basis.

Observations in support of the molecular character of the differences between soaped and unsoaped dyeings, were published in 1953, but at about the same time Sumner, Vickerstaff and Waters described investigations which they felt to confirm the crystallisation theory. In spite of a number of discussions, the experimental evidence then available was insufficient to decide between the two theories.

Since then extensive experimental material has been collected and it has been found that the molecular theory gives a better understanding of certain relationships between colour and constitution, which could not previously be explained. Furthermore, interesting connections have been found between the behaviour of vat dyeings and certain phenomena of interest in the chemistry of organic pigments.

On account of the scope and complexity of the problems involved, the paper was restricted to the 1,4-diaroylaminoanthraquinone dyes. A working hypothesis had been evolved according to which the different forms were to be regarded as representing a new type of contact isomerism, and could be visualised as partly existing in solid form, and in isolated cases even as crystalline, desmotropic modifications, in conformity with the earlier hypothesis of different polar forms. The marked effects of certain substituents on the colour, hitherto inexplicable, can be explained by a predominating effect on the resulting isomeric composition, acting alongside the normal effect of the substituents. Various anomalies that could occur during development could be readily explained on this basis.

A change in colour on developing a vat dyeing would always occur if the dye, after reoxidation, was first produced in a metastable form, which was stabilised by adsorption on the substrate, so that a certain activation energy was required to attain the most stable state of the dye under these conditions. If the differences in stability were great enough, it may be possible to attain these forms in colloidal solution or even as crystalline modifications.

The stability of these forms may be quite different to a different environment, e.g. in organic solvents. There were obvious parallels between these phenomena and the changes in colour which could be observed with organic solutions and were termed "solvatochromism" and "thermochromism." Like these phenomenas, the changes due to soaping could not be ascribed to one single cause, and the different possibilities of molecular variations such as isomerism, polymerism, and mesomerism must all be taken into account. According to the type of constitution, other causes may be operative, and it appeared possible that in the case of condensed ring systems, like dibenzanthrone and pyranthrone, it was more likely that different forms of stabilised equilibria of mesomers had to be considered rather than isomers proper. However, the latter probably played the major part in the indigoid series, with dipyrazoleanthronylene, with dyes having amide groups, and therefore with the azoic dyes.

Absorption of Chlorine by Resin-Treated Textiles

MR. W. SCHEFER of Switzerland, introducing his address on absorption of chlorine by resin-treated textiles, said that the application to textiles of synthetic resins, initially used to obtain crease-resistance on regenerated cellulose fibres, and more recently employed to a great extent to obtain the well-known "wash-and-wear" and similar affects on cotton fabrics, had given rise to the question of how best to treat this novel type of textile. The expert application of the resin finish to carefully selected types of fabric produced textiles which possessed valuable properties in use, but it entailed the risk of damage by retained chlorine in certain circumstances.

When hypochlorite was added to the wash liquor or to the rinse water, part of the chlorine was chemically bound by certain types of resin without immediate damage to the textile, but damage and sometimes destruction of the fabric would occur on subsequent ironing, mangling, steaming or other heat-treatments. This kind of damage was on the whole confined to countries where hypochlorite solutions were used for washing. In addition, the damage could be prevented by a simple treatment with reducing agents. Nevertheless, in many places the resistance to chlorine was made a condition of acceptance of the goods.

The problem had been studied by the Swiss Federal Laboratory for Testing Materials on the one hand to establish testing methods for the determination of the potential damage to which resin-finished textiles were exposed by retained chlorine, and on the other hand to find ways to prevent such damage. The absorption of chlorine occurred through reaction of the hypochlorite ion with primary or secondary amino groups in the resin with formation of compounds of the chloramide type. These compounds split off hydrochloric acid and atomic oxygen, and in consequence caused chemical damage. Simultaneously with the uptake of chlorine, decomposition of the resin by oxidation took place. The two processes influenced one another and both depended to a great extent on the temperature, pH, and concentration of the hypochlorite solution. With certain types of resin amounts of more than 0·03% of retained chlorine (on the weight of the fabric) could cause damage on heating, while with other resins such small quantities of chlorine were less harmful.

By applying the E.M.P.A. test method to numerous commercial samples a great mass of data was collected. They showed the behaviour of the various types of resins towards hypochlorite solutions, the effect of the conditions of condensation on chlorine retention, and further how the tendency to retain chlorine was affected by the washing treatment given to the textile material during use.

Discussing the test method, Mr. Schefer said that various investigations into the behaviour of resin-finished textiles towards chlorine mainly carried out in the U.S.A. had been concerned with the question of testing. The E.M.P.A. procedure was markedly different from the American suggestions. The problem in all these cases was to determine the risk to which textiles were exposed by chlorine retention on subsequent heating. In principle there were two different ways of doing this:—

(1) Determination of the fibre damage caused by a standard chlorine treatment and heating test, making use of the procedure which is employed at present (A.A.T.C.C. method).
(2) Analytical determination of the chlorine-retentive capacity in a standard hypochlorite solution and therefrom estimation of the heat damage to be expected in practice. A necessary condition for this test method is that there should be a relation between the amount of chlorine retained and the resistance to heat treatment. Considerable fluctuations occurred if one tried to establish such a relation. Nevertheless, knowledge of the chlorine-retentive capacity itself proved to be of great value.

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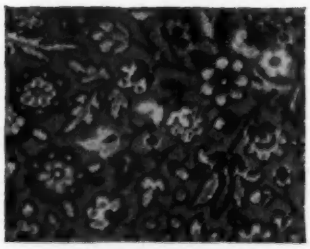

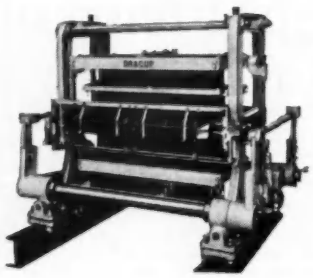

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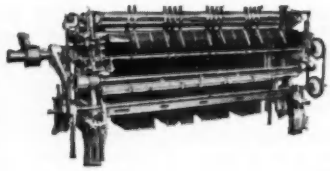

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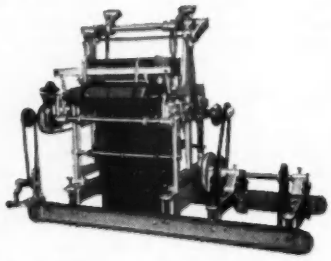

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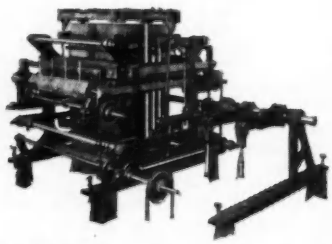

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Multitrade N.V. Westermarket 2, Amsterdam C.
Nieuw Guinea Import and Export, Maatschappij N.V., Van Eeghenstraat 112, Amsterdam.
Pacific Import Maatschappij N.V., Prins Hendrikkade 48, Amsterdam C.
Lindeteves—Jacoberg N.V., Lange Voorhout 86, The Hague.

South Africa: Woollens and Worsteds

E. W. Dunckley and Son (Pty.) Ltd., 96 Longmarket Street, Cape Town, would like to represent a U.K. manufacturer of woollen and worsted dressing-gown cloths. In addition to head office in Cape Town, they have offices in Johannesburg, Durban, Port Elizabeth and Bulawayo, and are able to cover the entire Union of South Africa and the Rhodesias. Manufacturers interested should write direct also notify the U.K. Trade Commissioner, P.O. Box 1346, Phoenix Building, 42 Burg Street, Cape Town.

Venezuela: Cotton Yarns

George Alfredo Wolf C.A., Conde a Pinango 11 (Apartado 1848), Caracas, want to represent a U.K. manufacturer of cotton hosiery yarn (32s - 50s) in hank form, grey or bleached. Established in 1941, they hold a number of U.K. agencies, and manufacturers interested should write direct, also notify the Commercial Secretariat, British Embassy, Edificio Titania, Plaza Estrella, San Bernardino, Caracas.

New Zealand: Piece Goods

A. Stuart Oxley Ltd., 207 T. and G. Buildings, Elliott Street, P.O. Box 5220, Auckland, C.1, would like agency arrangements with U.K. manufacturers of sheetings, pillow cottons and towels; winceyette and flannelette; drill and denim; dress fabrics of cotton, rayon and wool; worsted suitings and sports coatings; tweeds; printed furnishing fabrics. Manufacturers interested should write direct, also copy correspondence to the U.K. Trade Commission, P.O. Box 1467, 56-58 Shortland Street, Auckland, C.1.

Australia: Trimmings

W. T. Kenny and Co. Pty. Ltd., 143 Charlotte Street, Brisbane, wishes to contact U.K. manufacturers of trimmings. It is reported that the volume of business would not be large.

The firm have been established as manufacturers' agents for many years. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, M.L.C. Building, Corner Adelaide and Edward Streets, Brisbane.

Rhodesia and Nyasaland: Pillow Cases, Towels, etc.

Federated Central African Agencies (Pvt.) Ltd. of 18 Empire House, Main Street, Bulawayo, are interested in representing U.K. manufacturers of sheets, pillow cases and towels. F.C.A.A. has been operating as a manufacturers' representative in the Federation for over ten years. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, P.O. Box 984, R.T.A. House, Baker Avenue, Salisbury.

New Zealand: Worsted Piece Goods

John MacDougall and Co. Ltd., P.O. Box 139, Christchurch, C1, would like to contact a U.K. manufacturer of stripes and fancy worsted piece goods not already represented in New Zealand. They are an old-established firm and can give Dominion-wide coverage. Manufacturers interested should write direct, also notify the U.K. Trade Commissioner, P.O. Box 369, Government Life Insurance Building, Customhouse Quay, Wellington, C1.

* * *

Germany: Worsted Yarn and Mohair

The firm of Albert-Garne K.G., Wiesbaden, Biebricher Allee 91, would like an agency with a U.K. firm of worsted yarn and mohair spinners. Established in 1950, they have a sales branch in Reutlingen/Wuerttemberg and agencies in Munich, Hamburg and Moenchen-Gladbach. Manufacturers interested should write direct, also notify the British Consulate-General, Zeppelinallee 47, Frankfurt.

Sweden: Glass Fibre Tubing

Thorin and Thorin, Sten Sturegatan 8, Gothenburg, want to contact a U.K. supplier of glass fibre tubing for electric wiring. Registered in 1932, they are wholesalers and commission agents. Suppliers interested should write direct, also notify the British Consulate-General, Ostra Larmgatan 16, Gothenburg.

Syria: Crepe Rubber and Canvas

Mr. J. Arbagi, 56 Harika - Maamoun Street, Damascus, wants to contact U.K. suppliers of crepe rubber and canvas for the manufacture of sports shoes. Established in 1952, he is a merchant, commission agent and importer. Suppliers interested should write direct, also notify the Commercial Secretariat British Embassy, Rue Phenicie, Beirut, Lebanon.

Syria: Knitting Wool

Societe Khalil Fattal et Fils, Rue Ghassane, B.P.15, Damascus, want to contact U.K. manufacturers of spinning and weaving machinery for cotton, silk and wool; also knitting wool for factory use. Societe Khalil Fattal et Fils were registered in 1956 to continue the activity of "Khalil Fattal and Fils," founded in 1897. The company act as importers and distributors of general merchandise, manufacturers' representatives and commission agents. Manufacturers interested should write direct, also notify the Commercial Secretariat, British Embassy, Rue Phenicie, Beirut, Lebanon.

Sweden: Dress, etc. Cloths

C. B. Gedda AB, Sodra Vagen 12. Gothenburg 5, wants to represent a U.K. manufacturer of women's dress, skirt and coat fabrics. The coat fabrics should be high class novelty fabrics. Formed in 1929, the company are introduced to wholesalers and manufacturers of men's ready-made clothing and represent a number of foreign concerns, including one U.K. manufacturer of "Terylene"/wool skirtings. Manufacturers interested should write direct, also notify the British Consulate General, Ostra Larmgatan 16, Gothenburg, Sweden.

Sweden: Piece Goods

Ivan Lindberg and Co. AB, Arkaden, Gothenburg, would like to represent U.K. manufacturers of wool and worsted cloths (also "Terylene"/wool fabrics) for women's dresses, skirts and coats. Printed fabrics in non-iron and schreiner finish. Manufacturers interested should write direct also notify the British Consulate General, Ostra Larmgatan 16, Gothenburg.

Sweden: Rubberised Cloth

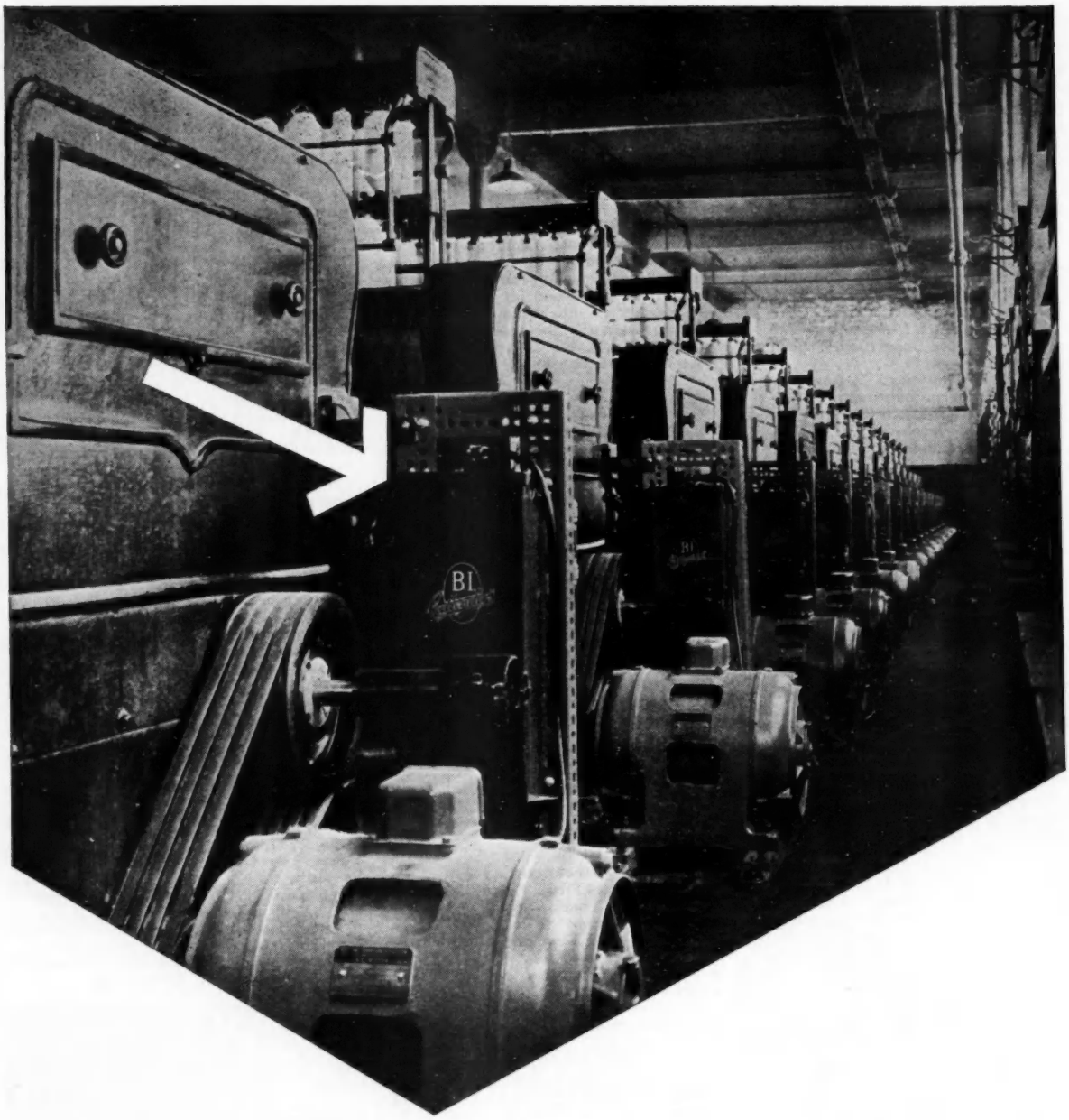
AB John Malmgard and Co., Drottninggatan 30, Gothenburg C, are interested in representing U.K. manufacturers of rubberised cloth for shopping bags. Established in 1934 they are importers and agents in the leather and manufactured leather goods trade. Manufacturers interested should write direct, also notify the British Consulate-General, Ostra Larmgatan 16, Gothenburg.

Bermuda: Irish Linen

A. J. Gorham Ltd., Front Street, Hamilton, Bermuda, want to contact a manufacturer of Irish table linen, particularly sea towels, suitably decorated with motifs, maps or pictures of scenes in Bermuda. They are a large and old-established firm and manufacturers interested should write direct, also notify the U.K. Trade Commissioner, Barclays Bank Building (P.O. Box 393), Kingston, Jamaica.

Germany: Woollen and Worsted Cloths

Hans Goettlich K.G., Seligenstadt Krs. Offenbach/Main, Querstrasse 3, are interested in U.K. supplies of woollen and worsted cloths. Established in 1947, they manufacture men's suits, overcoats, trousers and sports coats. Manufacturers interested should write direct, also notify the British Consulate-General, Zeppelinallee 47, Frankfurt.



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Textile Trade and Prospects

Linen Trade Review

With demand running at the present level manufacturers are mainly concerned with day-to-day problems, among which the raw material supply looms large. In their efforts to struggle out of the recession of the earlier months of the year, and to meet the growing competition of cotton and man-made fibre products margins were trimmed to an extent that permitted little upward movement in raw material values and the firmer conditions in recent weeks has caused concern. This is the result of a deliberate policy on the part of producers to raise flax values to a level that will ensure them an economic return. Many sustained serious losses last year following the decline brought about by low priced Soviet flax exports and the general trade recession. The substantial increase in flax production reported in Eastern Europe suggests that both the volume and price of exports from this area should tend to prevent prices in West European markets from getting out of hand.

The trend towards greater versatility is evidenced in all sections. This has resulted in part from the development of blends of flax with man-made fibres at the yarn and cloth state, as well as in the diversion of an increasing percentage of total capacity in spinning and weaving to the production of 100% man-made fibre yarns and fabrics. Despite this, there are still many uses in the domestic and industrial fields in which consumer preference for linen is unquestioned, and which still offer considerable scope for expansion provided prices can be kept competitive.

Cheapness and quality are determining factors of demand, and any innovation in machinery or practice which can influence these merit serious consideration. With man-made fibre prices dominating raw material markets, and the cost of production of bast fibre raw materials tending steeply upward on account of rising labour costs, which represent a substantial percentage of the selling price any innovation capable of stepping up yield or quality factors must merit serious consideration. Despite the changes in structure of the fibre flax growing industry in post-war years the thought still lingers in the minds of many mill executives that, some day, supplies will again be available on the pre-war scale.

With home and export demand at a high level most mills are working at, or near to capacity. Orders cover virtually the whole range of wet spun counts. The count range has contracted in recent years with changes in demand and in the supply of high grade fibre, and there is now little demand for yarns finer than 150 lea. Most mills have production sold to the end of the year and in view of the uncertainty of the raw material position are unwilling to accept further commitments.

While fibre deliveries are being stepped up in West European markets processors are deliberately controlling the volume in an effort to boost prices which, they maintain, have declined below production cost. The measure of success in this direction will be defined by the price and quantity of Soviet fibre made available for export during the present season. This source now determines world market prices, its influence having been extended in recent years by the improvement effected in fibre quality.

The contraction in weaving capacity over the last few years has strengthened the economic structure of this section so that business can now be booked at more remunerative rates. Much remains to be done to bring various units up to the level of efficiency that will eliminate unfair competition. Diversification of production in factories is extending much more rapidly than in the mills so that, in vertically integrated concerns it is virtually impossible to relate loom capacity with spindleage.

The output of all linen goods still consists largely of conventional lines. There is a growing tendency in these to break with the traditional in design and structure which has been largely responsible for the present high level of demand. Increasing interest in linen as a fashion fabric has stemmed from the use of a wider range of fabric weights for this purpose as well as from developments in dyeing and finishing practice. More extensive use of woven and printed ornamentation in household linens has increased sales and emphasised the importance of originality in presentation as a stimulant to consumer demand.

Wool Production and Consumption

For the first time on record, the Australian wool clip for the 1958 - 59 season ending in June exceeded 5 million bales. Details issued by Dalgety and Co. Ltd. estimate the clip at 5,056,925 bales, compared with 4,677,360 bales the previous season, an increase of 379,565 bales. The New Zealand clip is assessed at 1,565,679 bales, compared with 1,432,520 bales the previous season, an increase of 133,159 bales.

Total Australian and New Zealand production last season was therefore 6,622,604 bales, against 6,109,880 bales in 1957 - 58, an increase of 512,724 bales or 8%. In terms of net weight, Australian production last season was 1,539 million lbs., an increase of 46 million lbs. Sheep numbers were assessed by Messrs. Dalgety, at March last, as 152·6 millions in Australia and 47·2 millions in New Zealand, increases of 4·4 and 1·2 millions respectively. Owing to lower average prices last season, growers received less for their wool than in 1957 - 58. Last season's Australian receipts were £A295·6 millions, against £A337·8 millions the previous season; and those of New Zealand were £NZ63·4 millions against £NZ65·1 millions.

U.K. wool consumption in the first eight months of 1959 was 336·1 million lbs. (clean weight), or about 16% more than the 290·1 million lbs. used in the corresponding period of 1958. This year's figure is also slightly higher than the 334·8 million lbs. consumed in the Jan. - Aug. period of 1957—a year which saw British wool textile activity at one of its best levels since the war. These encouraging figures emerge upon analysis of statistics issued by the Wool Industry Bureau of Statistics. As it is the main holiday period, August does not afford an easy basis for comparison, but the July/Aug. U.K. wool consumption rate was slightly lower than in May/June, though 18% higher than in July/Aug. last year. Worsted yarn deliveries were 14% higher than a year earlier, and wool cloth deliveries 9% higher. August output figures, for a working month of 13½ days, were: wool consumption, 28·28 million lbs. (clean); top production, 17·23 million lbs.; worsted yarns delivered, 13·55 million lbs.; woven wool cloth delivered, 21·92 million sq. yds.; blankets delivered, 2·42 million sq. yds.

The Japanese government has decided that imports of wool into the country in the six months commencing October, 1959 shall be 882,000 bales, compared with 405,000 bales in the April/Sept. half-year lately concluded and 525,000 bales in the Oct./Mar. period of 1958 - 59. It is also announced by the Japanese Wool Fabric Manufacturers' Association that a 20% curtailment of loom activity lately in force in Japan will be removed this month. Under this curtailment, more than 4,000 looms have been out of commission.

Jute Fibre, Yarns and Cloths

Change in raw jute values in the immediate future is unlikely. Offers of fibre are freely made and there is not much buying interest from spinners in the main consuming countries. The few parcels of new crop material which have arrived here appear average and this may improve during the season. Offers are generally being made at £106 for Mill Firsts, at £88 10s. for Mill Lightnings, at £78 10s. for Mill Hearts and at £65 for grade Hearts, c.i.f. U.K., for Oct./Nov. shipment. Grade Tossa-2/3 is at £104 10s. and grade Tossa-4 at £93 with Continental Tossa-2/3 at £85. Crack Daisee-2/3 is available at £93 and grade Daisee-2/3 at £85, Oct./Nov. Probably less than the above rates would be accepted for afloat parcels but this is not attractive to spinners as they already hold stocks and are not interested in near-at-hand supplies.

Although registered sales to the U.K. during the first three months of the season are in excess of the cut-up, this does not mean that spinners have secured a larger quantity than actual consumption. A portion of registered sales relate to parcels so far not sold to spinners and now offered afloat. This may keep the market here rather weak despite any price movements in Pakistan. Business was interrupted by the Puja holidays in Pakistan and shippers have been anxious for business as loose jute from up-country has accumulated. Before any substantial rise in values

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can take place considerable demand for raw jute will have to develop.

The Calcutta goods market has remained steady. Hessian prices show little change and sacking values have remained near the level advanced to earlier in the year. Indian mills have experienced good demand for heavy goods and the stocks held have declined. Prices are now at 62s. for 10 oz. 40 in., and at 47s. 9d. for 7½ oz. per 100 yds. f.o.b. Calcutta for Oct. shipment, at 61s. 9d. and 47s. 3d. Nov. and at 61s. 6d. and 46s. 9d. Dec. B twills were at 156s. Oct., at 154s. 3d. Nov. and at 153s. Dec. Stocks of goods held by the Indian mills at the end of September were 700 tons higher for hessians but 3,100 tons lower for sackings compared with the previous month. The increased production brought about by unsealing 2½% of the silent looms earlier this year has been absorbed by a rise in offtake. This increased output will remain in force until the end of the year. Demand for Calcutta hessian from the U.K. has not been large but fair movement has occurred and should continue.

In Dundee, the yarn and cloth positions are satisfactory but the prospects ahead are difficult to assess. At this time of year considerable business has usually been placed for delivery months ahead, but consumers are now buying only immediate requirements. Present weakness in raw material markets indicates that this type of buying will continue for some time and mills in Dundee and district should continue fully employed although order books are not so full as usual. Demand from the carpet industry has been steady but stocks have been reduced and purchases are taking place only for early delivery. Prior to the general election a little slowing down of general business was noticeable but everything now points to a resumption of steady buying. The heavy end of the trade in Dundee has found business rather difficult. No sustained demand has been seen and output is below normal. The linen trade is generally quiet with nothing of an outstanding nature taking place. Spinners and manufacturers are fairly busy with most movement taking place in heavier cloths.

Cotton Yarn and Cloth Marketing

The most recent estimate of this season's production of American cotton indicates a crop of 14,692,000 bales against 14,678,000 given in an earlier estimate, and with a crop of 11,512,000 bales last season. Any doubts concerning the problems of supply and demand will now be resolved in the reported heavy ginnings. Nearly 2½ million bales were ginned in the latter half of September compared with under 1 million in the same period last season. In general, spinners have not been unduly affected by the U.S. dock strike although local supplies of most growths have not been very large.

In yarn and cloth the markets have been quite active with considerable inquiry in all directions. Some good business has been booked but the quantities, although numerous, have not been large. The delivery position has lengthened and would rapidly increase if salesmen and firms were willing to commit themselves further ahead in many lines. Nearly all qualities and counts have been dealt in, the majority being in standard single weaving types in coarse to medium qualities on ring beams, cop, cone and cheese. Fine, combed mule-type counts have been in much better demand than for some time although more interest in this direction would still be gladly welcomed. Hosiery qualities have been disposed of in greater volume and very low numbers and condenser types are in good demand. Interest is steadily maintained in blended yarns of viscose/cotton, nylon/cotton, "Terylene"/cotton, etc., also 100% man-made staple yarns. Novelty varieties find ready buyers in spite of the prices asked for many fancy folded types.

Some uneasiness has been felt in cloth trading circles regarding the recent agreement with Pakistan and India whereby the Pakistan ceiling for cotton goods sent to this country becomes 38 million sq. yds., and that for India 175 million sq. yds. These levels are to operate for a three-year period commencing January, 1960, subject to the continuance of the voluntary agreement with Hong Kong. In trading circles inquiry has been brisk and has covered a wide range of cloths mainly on home trade account. Prices, in general, have been firm and delivery dates have lengthened slightly. Many buyers are operating with greater enthusiasm than for some time The greatest volume of business has centred around dress fabrics including cotton, rayon, nylon, etc., in novelty patterns in jacquard and dobby weaves. Screen and roller printed types have been accorded considerable support and the unprecedented good weather has also played a valuable part in stimulating sales at retail and wholesale levels. Furnishing fabrics have moved along at a reasonable pace with traditional and contemporary designs in almost equal demand. All cotton and filament warp cotton weft fabrics have accounted for most of the business but specialities also have been accorded better support. In household textiles, a little more interest has been noticed in sheets, quilts, cotton blankets and tablecloths. Terry types are in fair request with main interest divided between medium-priced dobby designs and the higher qualities two-fold pile jacquard types. Good designs, bright colours and reasonable prices maintain a steady turnover. Export activity still remains poor with available business divided between the few Eastern outlets and Dominion and Continental markets.

Production of Man-Made Fibres

Production of man-made fibres in September was 36% more than a year earlier, this increase being shared equally between continuous c.f. yarn and staple. In the third quarter output was 43% more than in the third quarter of 1958 when production was depressed, and 9% more than in the same period of 1957. In the first six months of 1959 production was 10% more than a year earlier. There was a 32% increase in total deliveries of continuous c.f. yarn and staple to all using industries in the third quarter compared with a year ago. Deliveries of filament yarn for industrial purposes and weaving were 34% and 25% more respectively. Deliveries for cotton spinning were 23% more than in the third quarter last year. Deliveries for export, particularly of staple fibre, were substantially more in the third quarter than a year ago.

Production
(Million lb. "delivered weight" basis)

		C.F. Yarn (Singles)	Staple	Total
1958	July ..	15·4	17·5	32·9
	Aug. ..	12·4	12·5	24·8
	Sept. ..	14·5	17·4	32·0
1959	July ..	19·7	25·6	45·3
	Aug. ..	18·2	21·5	39·7
	Sept. ..	19·7	23·8	43·5

Deliveries of C.F. Yarns
(Thousand lb.)

	1958	1959	
	July-Sept.	Jan - March	July - Sept.
Weaving	13,501	16,224	16,853
Hosiery	3,744	5,286	5,119
Warp knitting ..	3,356	4,393	4,819
Industrial purposes (tyres, etc.) ..	13,746	18,593	18,387
Other purposes ..	2,448	2,546	2,652
Exports as yarn ..	7,390	8,963	9,671
Total	44,186	56,006	57,501

Deliveries of Staple
(Thousand lb.)

	1958	1959	
	July - Sept.	Jan. - March	July - Sept.
Cotton spinning ..	26,067	29,195	31,995
Wool spinning ..	11,146	16,272	15,394
Flax spinning ..	3,284	4,118	4,268
Other spinning systems and sundries	4,566	5,843	5,819
Exports	5,594	6,871	10,549
Total	50,657	62,300	68,025

Change of Address

The address of the Bristol branch office of English Electric Co. is now Equity and Law Building, 36-38 Baldwin Street, Bristol 1 (Bristol 27304).

* * *

Which Side of the Fence?

The driver of a heavy lorry could hardly hide his embarrassment as a man stopped in front of the cab. Stuck in the window was the pathetic notice "Buy British Cottons." Loaded in bales on the back was over 4 tons of grey cloth from Hong Kong on its way to a well-known Lancashire finishing firm.

* * *

Merger

Hess Products Ltd. and the Chemical Division of Armour Chemical Industries Ltd. have been merged under the name of Armour Hess Chemicals Ltd., of which half the share capital is controlled by Armour and Co., Chicago, whilst the other half is controlled by U.K. interests, including a substantial proportion by Associated Chemical Companies Ltd. From this integration of the production and selling organisations of the two companies, both British industry and the large export markets for these products should benefit. Sales of industrial chemicals will continue to be made from 4 Chiswell Street, London, E.C.1. The sales office for "Distec" fatty acids will be at Brotherton Chambers, Leeds 1.

* * *

Irish Linen

Mr. H. Brandenburg, Niedenau 60, Frankfurt-am-Main, would like to represent a U.K. manufacturer of Irish linen, table cloths and printed kitchen cloths. He has been in business since 1939, and manufacturers interested should write direct, also notify the British Consulate-General, Commercial Section, 47 Zeppelin Allee, Frankfurt-am-Main.

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Notes and News

Reversible Grating Monochromator

A new grating monochromator (D290) made by Hilger and Watts Ltd., 98 St. Pancras Way, Camden Road, London, N.W.1, is intended primarily for laboratory workers, microscopists, etc., who require a simple light source of variable wavelength. The instrument uses a plane grating as the dispersing element; this has 15,000 lines to the inch and gives a reciprocal dispersion of 70 A/mm. The slits, variable in width from 0 to 1 mm., are the simple unilateral form so coupled that, whatever their width, the peak wavelength of the transmitted radiation remains constant. The wavelength can be varied from 200 to 1,000 mμ and is controlled by a knob with an indicator reading to 1 mμ.

* * *

Gelatine and Glue Research

The Council of The British Gelatine and Glue Research Association have appointed Dr. D. A. Sutton, Ph.D.(Lond.), B.Sc., A.R.C.S., as director of research. Dr. Sutton will succeed Mr. A. G. Ward, O.B.E., M.A., F.Inst.P., the Director of Research since the formation of the Association in 1948, who is leaving to take the Chair of Leather Industries at Leeds University. The British Gelatine and Glue Research Association is the co-operative research organisation for the gelatine and glue manufacturing industry. The main emphasis of its work at its laboratories in North London is on fundamental research into the properties and behaviour of gelatine and glue derived from animal products.

* * *

Chairman of Australian Wool Bureau

Mr. W. A. Gunn, C.M.G., has been re-elected chairman of the Australian Wool Bureau, states a Reuter's message from Melbourne. The names of the members of the Australian Wool Bureau (who will hold office for the next three years) have also been announced. Nominated by the Australian Woolgrowers' Council were Messrs. T. G. Carter, C.B.E., M.C., of New South Wales, W. A. Gunn, C.M.G., of Queensland, and D. D. von Bibra of Tasmania. Messrs. C. B. Ball, Western Australia, B. A. N. Cole, New South Wales and F. R. Howell of Victoria were nominated by the Australian Wool and Meat Producers' Federation. Mr. von Bibra is a new member of the Bureau. The Commonwealth Government member is Mr. E. McI. Waterman, a former Chairman of the International Wool Secretariat.

* * *

Increased Demand for Wool Expected

More aggressive demand for wool is expected in the coming season and this should ensure a further strengthening of prices in spite of the forecast of a record world clip for 1959-60, according to Mr. H. J. Wardell (chairman, New Zealand Wool Board). He was making his annual address to the Board's electoral committee, and said he based this prediction on increased mill activity in the northern hemisphere coupled with Australia's expectations of increased buying by Soviet bloc countries. Mr. Wardell noted that during the last six months economic conditions throughout the world had changed completely and recession in some countries had given way to near boom conditions. He suggested that wool exporting countries consider co-ordinating the disposal of their clips. Better co-ordination, he said, would bring better and more stabilised prices and give the money spent on wool promotion a much greater impact.

* * *

T.I. Service Medal

The Textile Institute has awarded the Service Medal to Mr. W. Garner, F.T.I., of London, and Dr. A. R. Urquhart, of Manchester. Mr. Garner, a chartered textile consultant, is a former chairman of the Yorkshire Section and currently chairman of the London and District Section. Dr. Urquhart, honorary secretary of the Institute, is an assistant director of the British Cotton Industry Research Association. The awards will be presented at the Convocation in November.

* * *

"Acrilan" Fibre Prices

With the commencement of commercial scale production of "Acrilan" at Coleraine, N. Ireland, certain adjustments are being made to the terms of sale in the U.K.

The fibre in both staple and tow form will now be sold "delivery free in Great Britain and Ireland." The prices for standard "Acrilan" fibre delivered to any customer's address within Great Britain and Ireland is as follows:—

2 den. (tow or staple) 9s. 4d. per lb.
2·5, 3, 4, 5, 8 or 15 den. (tow or staple) 9s. 0d. per lb.

Any duties which may become payable on deliveries in the republic of Ireland will be for the buyer's account.

* * *

Mather Lecture

The President, Lord Derby, will preside at the annual dinner of the Textile Institute at the Reform Club, Manchester, on October 27. Prior to the dinner, the annual Mather lecture will be given by Dr. A. R. Urquhart, F.R.I.C., F.T.I., on "Education for the Textile Industry."

* * *

Textile Institute Finishing Group

The first meeting of the Textile Finishing Group will be on December 9 at the Lesser Free Trade Hall, Manchester. The chairman, Professor C. S. Whewell, of Leeds University, is an internationally recognised authority on textile finishing.

* * *

Retraining Cotton Workers

Retraining workers moving from one job to another because of reorganisation, is being vigourously tackled by the Productivity Centre of the Cotton Board. The director, Mr. J. Bolton, writing in the recently released issue of "Fielden House Notes," says that whilst specialised operative training methods have been largely used for training new workers to the industry, similar methods are equally suitable for retraining other workers. Retraining can be given to two types of worker. First to those who, having been trained on one type of machine, e.g., a Lancashire loom, need to be retrained to operate say, a Northrop. Secondly, retraining can be given to a person to enable him to reach a higher standard of quality or performance.

An experiment was recently conducted in which a number of mule spinners were trained in ring spinning. The ring spinners job was analysed into small parts. These were practised separately until they could be performed at normal production speed and the parts were then progressively combined until the whole task could be satisfactorily performed. The course of retraining lasted five weeks and management and men are well satisfied, says Mr. Bolton. An entirely new course is also mentioned. The last few years have seen a rapid increase in the amount and complexity of statistical data collected by firms to assist them in making sound business decisions. To provide an opportunity for management to have their own staff trained to the required level of statistical knowledge without recourse to a prolonged educational course, the Centre has arranged a course "Statistics in the Mill," starting December 7 and lasting two weeks.

* * *

Improving Vision in Spinning and Weaving

First introduced in 1954, the thread illuminator manufactured by Meiners' Optical Devices Ltd., 121 London Wall, E.C.2, for spinning machines was primarily for use where coloured yarns, or very fine counts were being spun, also in doubling, twisting and uptwisting. The "Loom-Lite" specially developed later for weaving sheds enables the operative to see distinctly parts of the machine not normally visible. The "Loom-Lite" throws a concentrated beam of light horizontally into the loom, giving better vision to the operative pick-finding or drawing-in a broken end through the healds and reed. It is also a powerful factor in diminishing fatigue and helps to eliminate errors and reduce spoiled pieces.

* * *

Polyester Fibre Agreement with Poland

I.C.I. Ltd., the Polish enterprises Polimex and Textilimport, have signed an agreement covering the purchase by Polimex of production know-how and a licence to enable a plant for polyester fibre to be built in Poland, and the purchase by Textilimport of polyester fibre which I.C.I. will supply to Poland during 1960-64.

* * *

T.I. Knitting Group

The next meeting of the Textile Institute's Knitting Group is to be held at Buxton, April 7 - 8, 1960.

* * *

Dyeing, Printing, etc., Technical Information

I.C.I. Ltd., Dyestuffs Division, Blackley, Manchester. The following are now available:—

No. 506—Printing of "Orlon" (Type 42), "Courtelle," "Acrilan" and "Dralon" Acrylic Fibres.

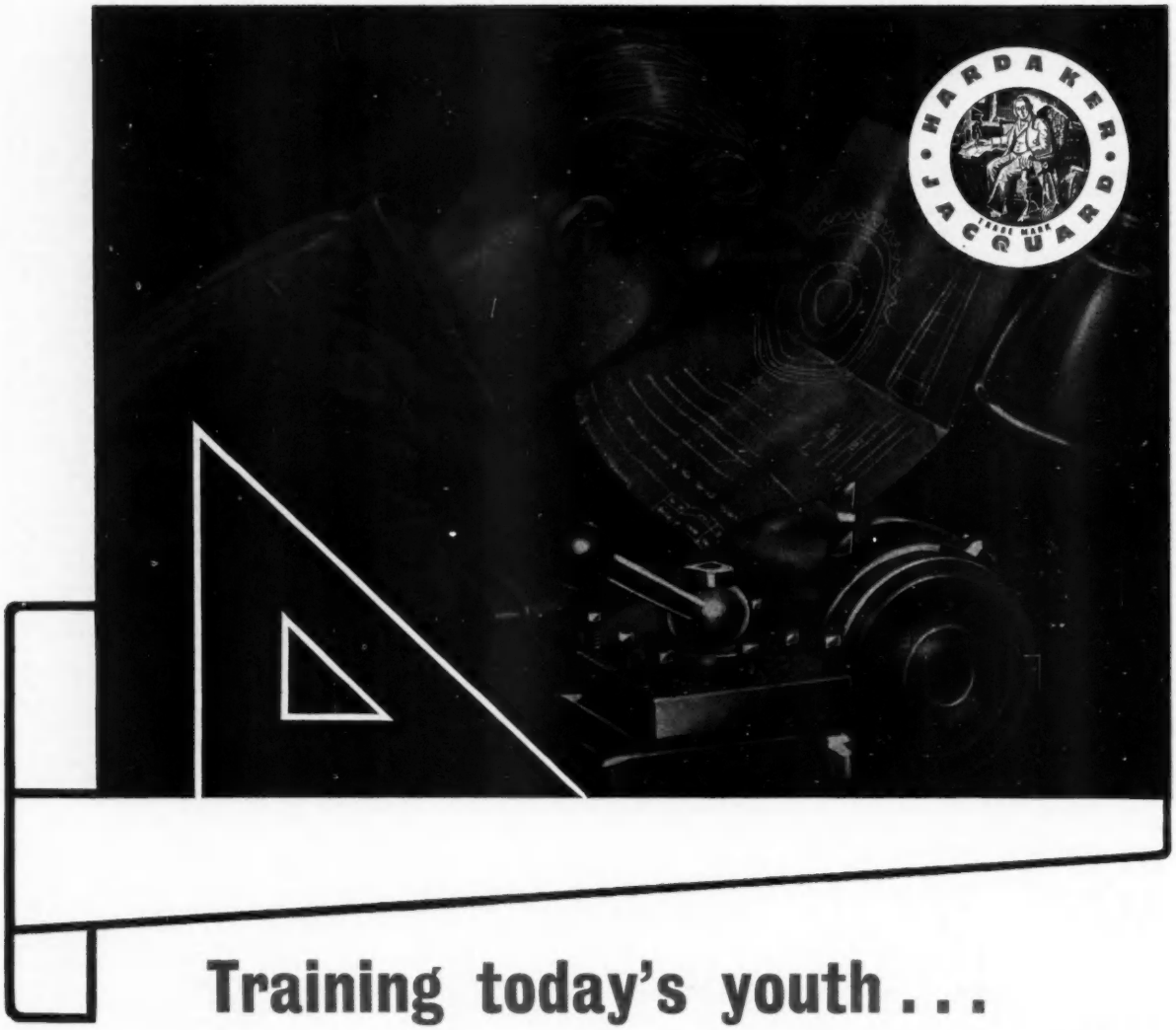
No. 507—Soledon Dyes: Application to Wool.

No. 508—Procinyl Dyes for Printing Nylon and other Synthetic Fibres.

No. 509—Calatac VB in Nylon Hose Finishing.

No. 510—Procion Dyestuffs on Cotton: Effect of Various Resin Treatments.

No. 511—Alcian Dyestuffs: Dyeing Wool/Cellulosic Unions.



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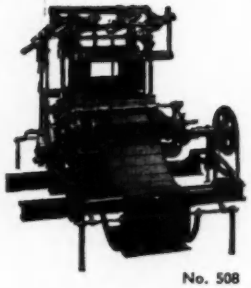

No. 508

Illustrated: 1320 Vincenzi Fine Pitch.

This latest model Double Lift Double Cylinder Jacquard — the finest in the world — embodies many refinements:— All machine-cut gears — Oilite bushes in mainshaft bearings — Oil retaining felt washers in vertical slide bearings — Combined adjustment of cylinder with Peg and Star Wheel Motion — Safety clutch for cylinder reversing motion — Cushion Motion to absorb shock previously experienced during the changing of hooks on springless machines.

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U.S.S.R. Buys British Textile Machinery

Platt Bros. (Sales) Ltd., a subsidiary of Stone-Platt Industries Ltd., announce they have received an order from the U.S.S.R. for cotton machinery valued at approximately £¼ million. This contract is mainly for 80 "Hartford" high production combers. These combers will be manufactured at the Oldham factory of Platt Brothers and Co. Ltd., and deliveries will commence early in the new year. This machine attracted considerable interest at the recent International textile machinery exhibition in Milan.

* * *

T.I. Design Competitions

Students at universities, technical colleges or art schools throughout Britain and overseas, who are contemplating entering for the 1960 design competitions of the Textile Institute, will find one factor very much to their liking—the prizes have been substantially increased. Full details are available in a booklet available free on application to the General Secretary of the Institute, 10 Blackfriars Street, Manchester 3.

* * *

Donegal Handwoven Tweed

The Donegal Handwoven Tweed Association, with headquarters in Dublin, is registering a trade mark to protect Donegal tweed from mass-produced imitations. Plans for the Irish industry include the designation of the native product as "Donegal handwoven tweed" and the special trade mark to be used—based on a form of the letter "D"—is being registered in Ireland, Britain, North America, the British Commonwealth countries, the Continent and all other important markets. To receive the mark the tweed must be woven on handlooms in Co. Donegal from pure, new wool.

* * *

Tweed Firm Installs Research Laboratory

A research laboratory, dyehouse, and boilerhouse have been installed as part of a £32,000 modernisation scheme at the Selkirk tweed manufacturing firm of Gibson and Lumgair Ltd. The dyehouse will enable the firm to dye most of its wool yarn and piece requirements instead of commissioning it. The equipment installed includes five vats capable of handling a total of 1,300 lbs. of wool at a time—the biggest has a capacity of 400 lbs. There are also four smaller yarn vats with a total capacity of 120 lbs. and two piece machines; all the machinery is stainless steel. The laboratory has been built as an extension to the dyehouse. Mr. T. H. Gibson, managing director, said it would enable the firm to exercise better quality control on raw materials and finished cloth.

* * *

Midland Silicones News-Sheet

Appearing bi-monthly, a new "controlled circulation" newsletter, *Midland Silicone News*, features information about the ways in which silicones are used in almost every industry. The company anticipate that the newsletter will help strengthen their ties with the industrial users of silicones and anyone wishing to receive copies should write to the head office of Midland Silicones Ltd., 68 Knightsbridge, London, S.W.1.

* * *

New Range of Pumps

An addition to their already extensive range of versatile "Monobloc" centrifugal pumps is announced by Worthington-Simpson Ltd., Lowfield Works, Newark, Notts. The new range is designated type "DO" and comprises open impeller type pumps specially designed to handle slurries, paper stock, liquids containing small solids, and viscous liquids as well as clear liquids. Capacities of from 10 to 360 g.p.m. and heads up to 86 ft., depending on capacity, are covered by this range of pumps.

* * *

Durable Pleats, etc. in Wool Cloth

Development work carried out by Professor Speakman (Leeds University) and chemists on the staff of Marks and Spencer Ltd. has produced a new finish for imparting durable creases or pleats to wool garments. Proban Ltd. are marketing this finish throughout the world under their registered trade mark "Immacula" under licence granted by Marks and Spencer Ltd. The "Immacula" finish is applied by the cloth finisher and not by the maker-up. The tailor or garment maker using "Immacula" material will be able to cut and fit in the normal way. Only at the final pressing of the garment—when he will use the technique prescribed—is the latent chemical change giving crease retention brought about and this calls for no use of chemicals by the tailor himself.

Cloth and garments in this new finish will carry the "Immacula" trade mark for which labels and tickets will be issued by Proban Ltd., provided they approve the quality standard. Proban Ltd. is jointly owned by Albright and Wilson Ltd. and Bradford Dyers' Association.

* * *

"Terylene" Filament Yarn Prices

Below are the new prices which came in force June 1, and those previously ruling.

Medium Tenacity		Old Price	New Price (per lb.)
25/12/¼s	Dull	19/-	19/- (no change)
40/24/¼s	Dull	13/4	13/4 (no change)
50/24/¼s	Dull & bright	12/-	12/6
50/24/¼s	Extra dull	12/9	12/9 (no change)
75/36/¼s	Dull & bright	11/4	12/1
75/48/¼s	Dull	11/10	12/7
100/48/¼s	Dull & bright	11/3	11/8
150/72/¼s	Dull & bright	11/2	11/2 (no change)

The price of high tenacity filament yarns, as well as E.H.D. and staple fibre, remain unchanged.

* * *

Wool Imports into Britain

Wool imports into the U.K. in the first four months of 1959 were 306·5 million lbs. (actual), compared with 257·9 million lbs. in the corresponding period of last year, an increase of nearly 20%. Trade and navigation accounts of B.o.T. also show that wool imports in April alone were 82·3 million lbs., one of the highest totals of recent months. Over the four months, imports from Australia of 136·2 million lbs. were 30 million lbs. more than in the corresponding period of last year; imports from New Zealand at 75 million lbs. were 2 million lbs. higher, and imports of 27·2 million lbs. from South Africa increased 6 million lbs. on a year ago. Larger shipments were also received from Argentina, India and Pakistan.

* * *

Hydraulic Equipment

British hydraulic equipment manufacturers have formed their own association, the "Association of Hydraulic Equipment Manufacturers," with offices at 38 - 40 Eccleston Square, London, S.W.1. The organisation will collect and distribute technical information, advise on exhibitions at home and abroad and encourage and sponsor research for the benefit of members.

New Companies

S. Murgatroyd and Co. Ltd. Private. Reg. July 9. Capital £5,000 in £1 shares. Piece merchants, woollen and worsted merchants and clothiers, etc. Registered office: 1 Cater Street, Bradford.

A. G. Leventis and Co. (Nigeria) Ltd. Reg. in Nigeria on March 24, 1958. Capital £1,000,000 in £1 shares. Shippers, warehousemen, textile merchants, etc. British address: 35 Peter Street, Manchester 2.

Lawrence Textiles Ltd. Private. Reg. July 10. Capital £1,000 in £1 shares. Registered office: 40 Brazennose Street, Manchester.

T. J. Martin and Son Ltd. Private. Reg. Aug. 5. Capital £2,000 in £1 shares. Manufacturers and dealers in textiles, fabrics and garments, etc. Registered office: 112 City Road, E.C.1.

H. W. Edmondson and Co. Ltd. Private. Reg. Aug. 11. Capital £5,000 in 4,000 preferred ordinary and 1,000 deferred ordinary shares of £1. Printers and manufacturers of labels made from textile or other materials, etc. Registered office: Beehive Mills, Thornton, Bradford 1.

Tarnroyd Miles Ltd. Private. Reg. July 15. Capital £10,000 in £1 shares. Manufacturers and dealers in wool, flax, jute, cotton, silk, etc. Registered office: 30 Hertford Street, W.1.

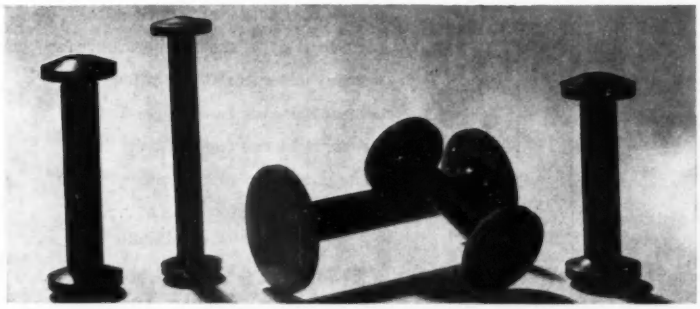
Cooper and Reveley Ltd. Reg. July 20. Capital £5,000 in £1 shares. Furnishing textiles and general warehousemen. Registered office: 291 Old Street, E.C.1.

Grandall Fabrics Ltd. Private. Reg. Aug. 10. Capital £1,000 in £1 shares. Manufacturers and merchants, etc. Registered office: 59 Piccadilly, Manchester 1.

Shaw (Elland) Ltd. Private. Reg. June 18. Capital £50,000 in £1 shares. Cotton spinners and doublers, etc. Registered office: 3 York Street, Manchester.

H. K. Mezger (Textiles) Ltd. Private. Reg. June 17. Capital £2,500 in £1 shares. Manufacturers and dealers in textiles, etc. Registered office: 65 London Wall, E.C.2.

Plastic Bobbins



These bobbins are moulded in Shell Chemical Co.'s "Carinex" high impact grade by H. J. Simpson (Plastics) Ltd. They are moulded in various colours and are designed for silk or nylon, etc., wound packages. Those shown are standard production items but special designs can also be manufactured.

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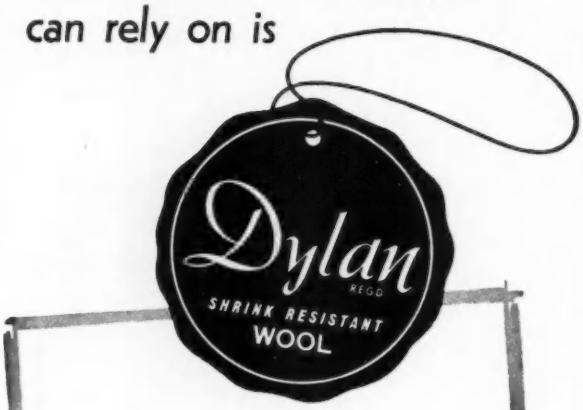

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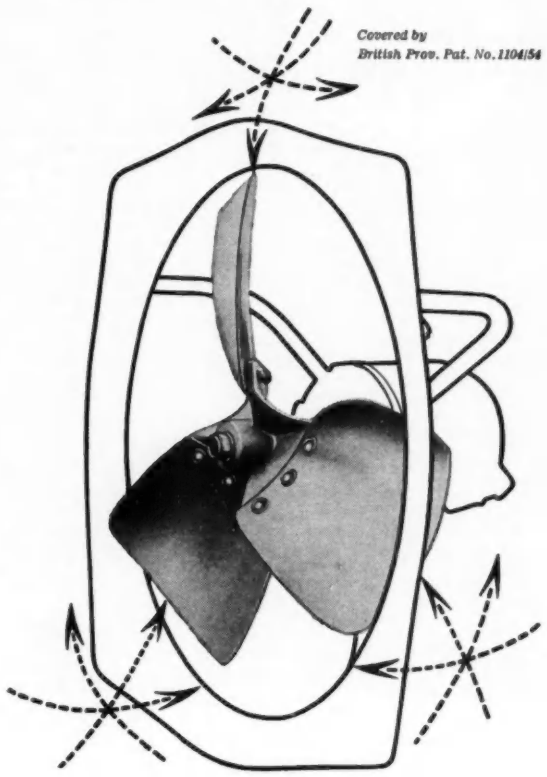
Covered by British Prov. Pat. No. 1104/54



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RECENT TEXTILE PATENTS

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800,314 Improved Heald Shafts

GROB AND CO., A.G., *Stockerstrasse 27, Horgen, Zurich, Switzerland.*

A loom heald shaft comprises fixed heald rails of rectangular cross-section which are located against longitudinal movement, and extend between, but do not project past a pair of side members of the shaft. Each heald rail engages in recesses in the side members and is capable of being flexed so as to disengage the ends from their recesses. At each end of the heald rail a latch is provided whereby the end may be held, either in its recess or in its position disengaged from its recess.

800,520 Dressing of Warp Yarns

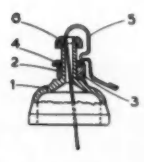
BRITISH NYLON SPINNERS LTD., *Pontypool, Monmouthshire.*

Process for applying a liquid dressing to yarns in warp form, wherein the dressing is applied continuously during winding to the outer layer of yarns wound upon a warp beam, by means of a roll having a resilient covering which bears against the outer layer of yarns and is driven by frictional contact. The covering of the roll is continuously supplied with the liquid dressing from a supply. Preferably, the arrangements for supply of liquid dressing are such that the faster the pressure roll is driven the greater will be the amount of dressing automatically supplied to it in unit time.

800,537 Tension Regulating Device on Twisting Spindles

BARMER MASCHINENFABRIK, A.G., *Wuppertal-Oberbarmen, Germany.*

A device for regulating yarn tension on twisting spindles, particularly cabled yarn twisting spindles, and is an improvement of B.P. No. 755,588. A permanent magnet 2 having a nose-like projection is fitted on to a yarn entry guide element 1. Located above the magnet is a non-magnetic disc 4 which is made of specially wear-resistant material, finishes flush with the projection on the magnet, and against which the yarn guide 5 bears. The head of the yarn entry guide element is formed by the fitted-on ring 6 which consists of highly wear-resistant material. The force exerted

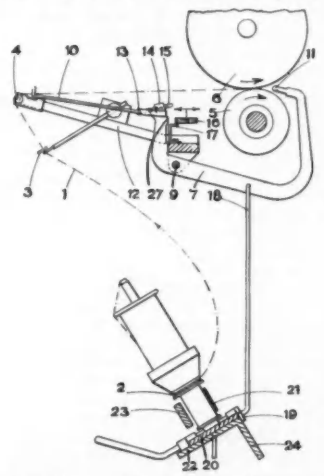


by the magnet diminishes with increasing distance from the pole, the magnet exhibiting its greatest force in the immediate vicinity of the pole. During normal operation the magnet has the effect of producing a continual braking action and high yarn tension, and the centrifugal force of the yarn guide leg is so far removed from the field of force of the magnet that the power of attraction of the magnet is less than the forces resulting from the mass of the rotating yarn guide leg. When the yarn breaks, the drop in tension and reduction in the amount of centrifugal force and in the rotational speed of the guide leg causes the leg to be drawn so near to the magnet that it comes within the range where the force of the magnet is greatest, and it is brought to a standstill and held fast.

800,539 Disconnecting Device for Double-Twist Machines

BARMER MASCHINENFABRIK A.G., *Wuppertal-Oberbarmen, Germany.*

A disconnecting device for double-twist machines, for automatically stopping the rotation of the spindle, and disengaging a winding bobbin from a driving roller, in the event of the yarn breaking. Twisted yarn 1 travels from a double-twist spindle 2 through a guide eye 3 and over a roller 4 to a winding device consisting of a constantly revolving roller 5 and a winding bobbin 6. A U-shaped disconnecting lever 7 pivots about a pin 9, and carries a yarn detector 10 at one of its ends and a disconnecting roller 11 at its other end. The roller 4 is supported by an arm 12 fixed on the frame. The yarn detector is in the form of a double lever and is mounted in a slot in a holder 13. The detector carries a weight 14 towards the end of one of its arms, this arm terminating in a packing member 15. The rail 16 in its reciprocatory movement, moves towards a pressure



surface 27 of the lever 7 to within a small distance, leaving a gap which is bounded by a bracket 17. In addition, the lever 7 has mounted on it a coupling rod 18 having a hooked end which engages in a bolt 19, whereby the latter is raised or lowered according to the movement of the lever 7. The bolt locks a base plate 20 of the twisting spindle in its normal running position, inwhich t he spindle bears against a driving belt 21. When the bolt is raised by the rod 18 the plate 20 is released and, while being suitably guided, automatically swivels about an eccentrically arranged holding pin (not shown) on a sloping spindle bench 22 until the spindle bears against a brake 23. When the spindle, with the base plate is forced back into the operative position, the bolt 19 re-engages over an edge 24 of the spindle bench and the device is then locked again.

800,543 Weft Replenishing on Looms

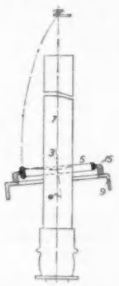
G. A. RENSHAW, 1028 *Manchester Road, Linthwaite, Huddersfield.*

A loom has two or more shuttle boxes arranged in a battery one above the other, and a mechanism for replenishing the weft in a shuttle in any one of the shuttle boxes of the battery. The shuttle boxes are displaced horizontally so that no one box is vertically above another box making it possible to insert a weft package through the top of each shuttle box.

800,555 Spinning for Nylon Monofilaments, etc.

BRITISH NYLON SPINNERS LTD., *Pontypool, Monmouthshire.*

Nylon monofilament yarn 1 is wound up by a ring and traveller system in which the angle of intersection θ between the axis 3 of the ring 5 and the axis 7 of the spindle is 5°, this angle being brought about by mounting the ring-rail 9 so that it is tilted about its axis. The tilting of the axis of the ring may be achieved by so mounting the ring holder 15 that it is raised at one



side or by mounting the ring on an inclined ring holder. Nylon monofilament yarn wound in this way is very suitable for direct warping owing, firstly, to the ease of take-off of the yarn over the end of the wound bobbin and owing, secondly, to the relaxed state of the yarn brought about by the cross-winding, which relaxation makes for a more even warp.

800,819 Shuttleless Loom

WEAVING RESEARCH AND TEXTILE COMMISSION AGENTS LTD., *Ballamoar Castle, Jurby, Isle of Man.*

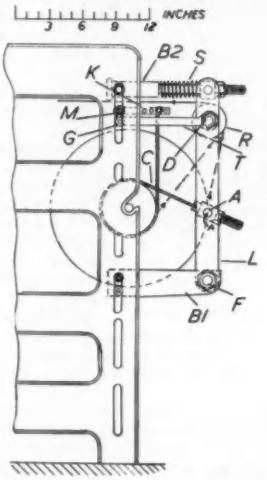
Describes a loom in which the weft yarn, which is obtained from a stationary weft package, is carried across the full width of

the cloth by a reciprocatory spear, provided with means for gripping the yarn at or near its forward end. The action of the gripper relatively to the weft is, in all positions of the spear, under the control of grip adjusting means forming part of the loom structure.

800,829 Loom Let-Off Motion

S. F. BENSON, *6b Wellington House, Cold Bath Road, Harrogate.*

An automatic let-off motion for a loom warp beam has a circular back rail R over which the warp threads pass, which is carried at each end upon levers L. The levers are pivoted at F upon a bracket B_1, and their working position is controlled within definite limits by means of springs S supported on a second bracket B_2. The chain, or band C which provides the



required braking effort upon the beam ruffles, is attached at its tighter end by means of an adjusting screw and nut to a pivot joint A on the roller carrying levers, and at its slacker end to the dependent arm of a bell-crank lever K at an adjustable distance from its fulcrum M. The other arm of this bell-crank lever is operated at G by the roller carrying levers from the pivot joint D by means of the strut T. Angular movement of the roller carrying levers about their fulcrum thus changes the tension at each end of the braking chain, and therefore the braking effort exerted by it upon the warp beam ruffles.

800,840 Holding Weft End in Pirn Changing Loom

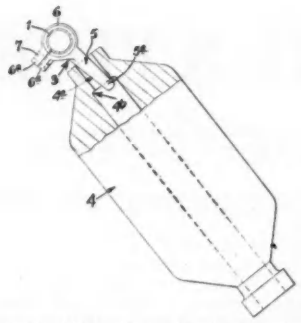
RYDBOHOLMS AKTIEBOLAG, *Rydboholm, Sweden.*

A method of catching and holding the loose weft end of a bobbin to be introduced into the shuttle of a weft replenishing loom. A flow of air is caused to advance the end on to a place where it is caught and held stationary during the transfer operation and at least the next stroke of the shuttle. The envelope surface of the bobbin is subjected to a flow of air by means of one or more nozzles advanced along the surface in the longitudinal direction of the bobbin, whereby the end is released and fed to the catching means.

800,952 Creel Storage Device for Speed and Ring Frames

CASABLANCAS HIGH DRAFT CO. LTD., *Bolton Street, Salford* 3.

Improved storage device for the replacement of bobbins of speed and ring spinning frames. The creel of a frame is provided with an overhead rail 1 which extends above the creel frame, so as to overhang one side of this frame. Spaced at intervals along the rail are bobbin holders 3. Each holder holds a replacement bobbin 4 from the upper bobbin end, and is constituted by a finger 5 which extends from a split collar 6, the latter being shaped to clamp around the rail. The collar is provided on opposite sides of the split with lugs 6*a* having registering apertures in which a bolt 7 is engaged. The finger 5 may have an elliptical cross-section near the outer end terminating in a shallow flat faced hook 5*a*. Each bobbin holder is clamped on the rail so that the finger 5 inclines away from the underlying creel frame, whilst the finger hook 5*a* is directed upward. With the holder thus positioned, the bore 4*a* at the top of the bobbin can be engaged over finger 5 to locate the hook 5*a* behind a shoulder 4*b* which is formed at a position inset from the upper bobbin end. When the bobbin is released after location on the finger, the weight of the bobbin will have a tilting effect, the bobbin swinging on the hook into the illustrated retained position which is reached when the lip of the bore opening 4*a* abuts the rear finger edge. Once in this position, the bobbin cannot be withdrawn from the finger until it is moved back into axial alignment and is lifted clear of the hook 5*a*.



801,109 Inspection Aid in Weaving

SULZER FRERES, SOCIETE ANONYME, *Winterthur, Switzerland.*

A method of controlling a loom of the kind in which some of the motions can be disconnected from other motions and from the loom drive, for instance, for the purpose of rectifying faults in the weave. This disconnecting action sets a tripping mechanism which is tripped to stop the loom after the main shaft has reached a predetermined angular position consequent upon restarting the loom after reconnection of the device. Thus when as a result of a fault the loom has been stopped, some of the motions have been disconnected from the drive and from other motions, the fault has been rectified and the loom re-started, it will be automatically stopped again by the tripping mechanism. This provides an opportunity to the operator to check that the fault has been properly rectified before weaving is continued.

801,299 Improved Loom Construction

MASCHINENFABRIK RUTI A.G., *Ruti, Zurich, Switzerland.*

A loom construction in which the available heald space may readily be varied, without any other structural elements having to be replaced or changed. The

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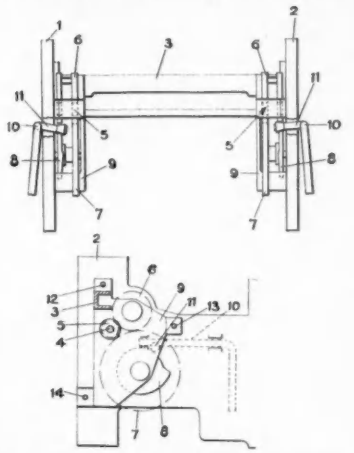
loom has a heald space defined in depth between a sley in the front part of the loom and at least one rear transverse element of the loom. The structural element is mounted for limited adjustment towards or away from the sley to vary the heald space depth and also to vary the number of healds which can be accommodated one behind the other in this space.

801,301 Loom Construction

VEB WEBSTUHLBAU NEUGERSDORF 2/4 *Dr. Koch Strasse, Neugersdorf/SA, Germany.*

Concerns tappet looms having a drive shaft which through appropriate gearing operates the sley mechanism and the picking tappets. The frame walls 1 and 2 are connected together by a cross member 3. A drive shaft 4 extends across the width of the machine and has gears 5 keyed at



each end which mesh with gears 6 associated with the sley mechanism. The gears 6 are in mesh with gears 7 which operate the picking tappets 8. The gears 6, 7 and the picking tappets are supported in bearings in a plate 9, each plate being attached to the inner face of the frame walls. Each plate is attached to its respective frame wall at three points 12, 13 and 14 to ensure a rigid connection. Picking shafts 10 are supported in bearings on the outer wall of the frame walls, and an arm 11 which is welded to each shaft 10, passes through the walls to engage tappets 8. A frame for a loom is thus provided of simple construction, which successfully conceals and protects the sley and picking drive gears and which may be assembled in an easy and simple manner.

801,335 Twisting and Crimping Filaments

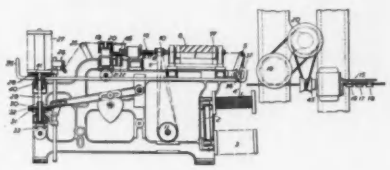
BRITISH NYLON SPINNERS LTD., *Pontypool.*

A process for imparting a false twist to a running filament according to Claim 5 of B.P. 797,051 wherein the ratio of the filament speed to the surface speed of that part of the rotating internal surface with which the filament makes contact is not less than 0·5. The invention also comprises a process for crimping a thermoplastic filament wherein a false twist is imparted to the said filament according to the above-mentioned process and the filament is heated over succeeding lengths of itself which are in the highly twisted condition to an extent sufficient to set the twist whilst the filament is allowed to contract by at least 2%, the succeeding lengths of twist-set filament are then cooled before untwisting, and the filament is untwisted and then wound up under low tension.

801,342 Removing Loose Fibres from Cord or Twine

JAMES MACKIE AND SONS LTD., *Albert Foundry, Belfast.*

Relates to shearing machines for yarn, cord and twine of fibres such as flax, hemp, jute, etc. The yarn is taken from a let-off bobbin 1 supported by a carrier 2 which also bears a second bobbin 3 which can be moved into position when the first bobbin is exhausted. The yarn 4 is led around a guide 5 and along the top of a ledger blade 6 where it is sheared by a rotary cutter 7 provided with a series of helical shearing blades 8. The cutter is driven by a belt 9 passing around a pulley 10 and driven from pulley 11. After passing the cutter, the yarn is engaged by a false twist device 15, the yarn passing in and out behind the roller 18, in front of roller 17 and behind roller 16. The device thus grips the yarn in its passage round the rollers and rotation of the device applies a twist in one sense to the yarn lying between the device 15 and the guide 5 and removes twist in the yarn to the left of the device. After leaving the device 15, the yarn passes to a pair of haul pulleys 19 and 20. The haul pulley 19 being positively driven by means of a bevel 21 while pulley 20 rotates idly on its shaft 22. The yarn makes a series of turns around the pair of pulleys and then passes over a guide 25 and thence via a traversing mechanism 26 to a take-up bobbin 27. The take-up bobbin is mounted in a bobbin carrier 28 having a shaft 29 extending to a friction clutch having members 30 and 31 separated by a layer of friction material 32. The clutch is driven through bevel gearing



33 thereby transmitting the drive to the bobbin 27 and serving to wind up the yarn. The friction clutch is controlled by means of a hand lever 35 pivoted at 36 to a link 37, in its turn pivoted at its upper end. The lever 35 is provided with a pin 40 bearing against a cam surface 41 on the lower side of the carrier 28. When lever 35 is moved to the right, the pin 40 bears against the cam surface, lifting the carrier 28 to free the friction clutch and thus to stop rotation of the take-up bobbin 27, the stopping of the bobbin being assisted by the frictional bearing of pin 40 against the surface 41. As soon as the bobbin 27 stops, the yarn leading to it becomes slack and it is essential that the false twist device should also stop in order to avoid snarling of the yarn. For this purpose the device 15 is driven by movement of the yarn itself, the yarn leaving the false twist device passing around the lowest groove in the pulley 19 and then around the lowest groove of the pulley 20. After that the yarn passes around a pulley 45 mounted on the shaft of the false twist device after which it passes back to the second groove from the bottom of pulley 20, and from there to the third groove from the bottom of the pulley 19.

801,863 Improved Flyers

G. MEYER-BUSCHE, *Pieneznauerstrasse* 10, *Munich* 27, *Germany.*

A flyer has two downward tapering arms connected to a bell-shaped dome, the dome and arms being made of synthetic plastic and the arms having inwardly projecting wall reinforcements. One of the arms contains a thread-guiding channel having an opening which leads to the outside and intersects the channel tangentially, and also containing bearings for a shaft fixed to the presser finger and a coil spring which acts on the presser finger and in addition tends to counteract centrifugal force acting on the presser finger. A double-armed lever, the lower end of which can engage in the presser finger and the upper part of which is resiliently supported and effects the disengagement of the finger on being pressed inwardly is also arranged on this one arm.

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Back Numbers Wanted

TEXTILE MANUFACTURER, back issues, November 1958 to June 1959 required. If you can offer any at all please write quoting price to Bailey Bros. and Swinfen Ltd., Subscription Dept., Hyde House, West Central Street, London, W.C.1.

Patents for Sale or Licence

THE proprietor of British Patent No. 786833 for a "Method of and apparatus for decatizing fabrics" is desirous of entering into negotiations for the sale of this Patent or for the grant of a licence thereunder. Communications should be addressed to Cope and Co., 65 Victoria Street, London, S.W.1.

THE proprietors of British Patent No. 755403, dated November 25, 1954, relating to "Mechanism for Simultaneous Transverse Adjustment of Bottom Back Roll Bearings in a Textile Drafting Machine" are desirous of entering into an arrangement by way of a licence or otherwise in reasonable terms for the purpose of exploiting the above patent and ensuring its practical working in Great Britain. All enquiries to be addressed to: Heron Rogers and Co., Bridge House, 181 Queen Victoria Street, London, E.C.4.

Miscellaneous

STUDENTS and Designers who require an inexpensive instrument for the determination of yarn count in pattern analysis are invited to write to H. McMorran, 103 Meigle Street, Galashiels, Selkirkshire, for a descriptive leaflet of "The McMorran Gristing Balance." See also this journal, January, 1959

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